CITY OF SEATTLE

City Council

Agenda

Monday, February 1, 2021

2:00 PM

Remote Meeting. Call 253-215-8782; Meeting ID: 586 416 9164; or Seattle Channel online.

M. Lorena González, President
Lisa Herbold, Member
Debora Juarez, Member
Andrew J. Lewis, Member
Tammy J. Morales, Member
Teresa Mosqueda, Member
Alex Pedersen, Member
Kshama Sawant, Member
Dan Strauss, Member
Chair Info:206-684-8809; Lorena.González@seattle.gov

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Committee Website:
http://www.seattle.gov/council

In-person attendance is currently prohibited per Washington State Governor's Proclamation 20-28.15, until the COVID-19 State of Emergency is terminated or Proclamation 20-28 is rescinded by the Governor or State legislature. Meeting participation is limited to access by telephone conference line and online by the Seattle Channel.

Register online to speak during the Public Comment period at the 2:00 p.m. City Council meeting at http://www.seattle.gov/council/committees/public-comment.

Online registration to speak at the City Council meeting will begin two hours before the 2:00 p.m. meeting start time, and registration will end at the conclusion of the Public Comment period during the meeting. Speakers must be registered in order to be recognized by the Chair.

Submit written comments to all Councilmembers at Council@seattle.gov
Sign-up to provide Public Comment at the meeting at http://www.seattle.gov/council/committees/public-comment
Watch live streaming video of the meeting at http://www.seattle.gov/council/watch-council-live
Listen to the meeting by calling the Council Chamber Listen Line at 253-215-8782 Meeting ID: 586 416 9164
One Tap Mobile No. US: +12532158782,,5864169164#

A. CALL TO ORDER

B. ROLL CALL

C. PRESENTATIONS

D. APPROVAL OF THE JOURNAL

Min 317 January 25, 2021

Attachments: Minutes

E. ADOPTION OF INTRODUCTION AND REFERRAL CALENDAR

Introduction and referral to Council committees of Council Bills (CB), Resolutions (Res), Appointments (Appt), and Clerk Files (CF) for committee recommendation.

IRC 288 February 1, 2021

Attachments: Introduction and Referral Calendar

F. APPROVAL OF THE AGENDA

G. PUBLIC COMMENT

Members of the public may sign up to address the Council for up to 2 minutes on matters on this agenda; total time allotted to public comment at this meeting is 20 minutes.

Register online to speak during the Public Comment period at the 2:00 p.m. City Council meeting at http://www.seattle.gov/council/committees/public-comment.

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H. PAYMENT OF BILLS

These are the only Bills which the City Charter allows to be introduced and passed at the same meeting.

CB 119994 AN ORDINANCE appropriating money to pay certain audited claims for the week of January 18, 2021 through January 22, 2021 and ordering the payment thereof.

I. COMMITTEE REPORTS

Discussion and vote on Council Bills (CB), Resolutions (Res), Appointments (Appt), and Clerk Files (CF).

PUBLIC SAFETY AND HUMAN SERVICES COMMITTEE:

1. Appt 01757 Appointment of Curry Mayer, Director of the Office of Emergency Management.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Herbold, González , Lewis, Morales, Sawant
Opposed: None

Attachments: Appointment Packet
Confirmation Questions and Responses

COMMUNITY ECONOMIC DEVELOPMENT COMMITTEE:

2. CB 119982 AN ORDINANCE relating to the Seattle Commission for People with Disabilities; changing the name to the Seattle Disability Commission; and requesting that the Code Reviser revise the Seattle Municipal Code accordingly.

The Committee recommends that City Council pass the Council Bill (CB).
In Favor: 4 - Morales, Juarez, Pedersen, Sawant
Opposed: None
Absent(NV): 1 - Lewis

Supporting Documents: Summary and Fiscal Note

3. Appt 01618

Appointment of Rebecca Bryant as member, Seattle Women's Commission, for a term to July 1, 2022.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Morales, Lewis, Juarez, Pedersen, Sawant
Opposed: None

Attachments: Appointment Packet

4. Appt 01627

Appointment of Abriel Johnny as member, Seattle Women's Commission, for a term to July 1, 2022.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Morales, Lewis, Juarez, Pedersen, Sawant
Opposed: None

Attachments: Appointment Packet

5. Appt 01767

Appointment of Steven Pray as member, Seattle LGBTQ Commission, for a term to October 31, 2021.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 4 - Morales, Lewis, Juarez, Sawant
Opposed: None
Absent(NV): 1 - Pedersen

Attachments: Appointment Packet

6. Appt 01768

Reappointment of Manuel Venegas as member, Seattle LGBTQ Commission, for a term to October 31, 2021.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 4 - Morales, Lewis, Juarez, Sawant
Opposed: None
Absent(NV): 1 - Pedersen

Attachments: Appointment Packet

7. Appt 01769

Reappointment of Christopher M. Brown as member, Seattle LGBTQ Commission, for a term to October 31, 2021.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 4 - Morales, Lewis, Juarez, Sawant
Opposed: None
Absent(NV): 1 - Pedersen

Attachments: Appointment Packet

8. Appt 01770

Reappointment of Latosha Correll as member, Seattle LGBTQ Commission, for a term to April 30, 2021.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 4 - Morales, Lewis, Juarez, Sawant
Opposed: None
Absent(NV): 1 - Pedersen

Attachments: Appointment Packet

9. Appt 01771

Appointment of Ryan Bush as member, Seattle LGBTQ Commission, for a term to October 31, 2022.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 4 - Morales, Lewis, Juarez, Sawant
Opposed: None
Absent(NV): 1 - Pedersen

Attachments: Appointment Packet

10. Appt 01772

Appointment of Nathaniel Higby as member, Seattle LGBTQ Commission, for a term to April 30, 2022.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 4 - Morales, Juarez, Pedersen, Sawant
Opposed: None

Attachments: Appointment Packet

11. Appt 01773

Reappointment of Jessi Murray as member, Seattle LGBTQ Commission, for a term to April 30, 2022.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 4 - Morales, Lewis, Juarez, Sawant
Opposed: None
Absent(NV): 1 - Pedersen

Attachments: Appointment Packet

12. Appt 01774

Appointment of Brett Pepowski as member, Seattle LGBTQ Commission, for a term to April 30, 2022.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 4 - Morales, Lewis, Juarez, Sawant
Opposed: None
Absent(NV): 1 - Pedersen

Attachments: Appointment Packet

13. Appt 01775

Appointment of Hannah Wilson as member, Seattle Commission for People with Disabilities, for a term to April 30, 2021.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Morales, Lewis, Juarez, Pedersen, Sawant
Opposed: None

Attachments: Appointment Packet

14. Appt 01776

Reappointment of Anquida Adams as member, Seattle Commission for People with Disabilities, for a term to April 30, 2022.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Morales, Lewis, Juarez, Pedersen, Sawant
Opposed: None

Attachments: Appointment Packet

15. Appt 01777 Reappointment of Daniel Kogita as member, Seattle Commission for People with Disabilities, for a term to April 30, 2022.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Morales, Lewis, Juarez, Pedersen, Sawant
Opposed: None

Attachments: Appointment Packet

16. Appt 01778 Reappointment of Kaitlin Skilton as member, Seattle Commission for People with Disabilities, for a term to October 31, 2022.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Morales, Lewis, Juarez, Pedersen, Sawant
Opposed: None

Attachments: Appointment Packet

FINANCE AND HOUSING COMMITTEE:

17. Appt 01732 Reappointment of Paula L. Houston as member, Seattle Housing Authority Board, for a term to March 20, 2024.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Mosqueda, Herbold, González , Lewis, Strauss
Opposed: None

Attachments: Appointment Packet

18. Appt 01733 Reappointment of Paul Breckenridge as member, Community Roots Housing Public Development Authority Governing Council, for a term to March 31, 2023.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Mosqueda, Herbold, González , Lewis, Strauss
Opposed: None

Attachments: Appointment Packet

19. Appt 01734

Reappointment of Jillian Cronauer as member, Community Roots Housing Public Development Authority Governing Council, for a term to March 31, 2023.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Mosqueda, Herbold, González , Lewis, Strauss
Opposed: None

Attachments: Appointment Packet

20. Appt 01735

Appointment of Sara Cubillos as member, Community Roots Housing Public Development Authority Governing Council, for a term to March 31, 2023.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Mosqueda, Herbold, González , Lewis, Strauss
Opposed: None

Attachments: Appointment Packet

21. Appt 01736

Reappointment of Bob Fikso as member, Community Roots Housing Public Development Authority Governing Council, for a term to March 31, 2023.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Mosqueda, Herbold, González , Lewis, Strauss
Opposed: None

Attachments: Appointment Packet

22. Appt 01737

Appointment of Michelle Morlan as member, Community Roots Housing Public Development Authority Governing Council, for a term to March 31, 2023.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Mosqueda, Herbold, González , Lewis, Strauss
Opposed: None

Attachments: Appointment Packet

23. Appt 01738

Appointment of M. Michelle Purnell-Hepburn as member, Community Roots Housing Public Development Authority Governing Council, for a term to March 31, 2023.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Mosqueda, Herbold, González , Lewis, Strauss
Opposed: None

Attachments: Appointment Packet

24. Appt 01739

Reappointment of George M. Staggers as member, Community Roots Housing Public Development Authority Governing Council, for a term to March 31, 2023.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Mosqueda, Herbold, González , Lewis, Strauss
Opposed: None

Attachments: Appointment Packet

25. Appt 01740

Reappointment of Derrick L. Belgarde as member, Community Roots Housing Public Development Authority Governing Council, for a term to March 31, 2022.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Mosqueda, Herbold, González , Lewis, Strauss
Opposed: None

Attachments: Appointment Packet

26. Appt 01752

Reappointment of Rachel Ben-Shmuel as member, Community Roots Housing Public Development Authority Governing Council, for a term to March 31, 2022.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Mosqueda, Herbold, González , Lewis, Strauss
Opposed: None

Attachments: Appointment Packet

27. Appt 01760 Appointment of Jeanie Chunn as member, Labor Standards Advisory Commission, for a term to April 30, 2022.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Mosqueda, Herbold, González , Lewis, Strauss
Opposed: None

Attachments: Appointment Packet

28. Appt 01761 Appointment of Ilona Lohrey as member, Labor Standards Advisory Commission, for a term to April 30, 2022.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Mosqueda, Herbold, González , Lewis, Strauss
Opposed: None

Attachments: Appointment Packet

29. Appt 01762 Reappointment of Artie M. Nosrati as member, Labor Standards Advisory Commission, for a term to April 30, 2022.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Mosqueda, Herbold, González , Lewis, Strauss
Opposed: None

Attachments: Appointment Packet

30. Appt 01763 Reappointment of Samantha Grad as member, Labor Standards Advisory Commission, for a term to April 30, 2022.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Mosqueda, Herbold, González , Lewis, Strauss
Opposed: None

Attachments: Appointment Packet

LAND USE AND NEIGHBORHOODS COMMITTEE:

31. CB 119992

AN ORDINANCE relating to Seattle's construction codes; adopting the Seattle Boiler Code, Building Code, Electrical Code, Existing Building Code, Fuel Gas Code, Mechanical Code, Plumbing Code, and Residential Code by reference, amending certain chapters of those codes, and adopting new chapters for those codes; correcting references to those codes in the Seattle Municipal Code; making technical corrections; adding a new Chapter 22.101 to the Seattle Municipal Code; amending the title of Subtitle I of Title 22, Sections 5.73.020, 6.410.070, 6.420.030, 22.170.010, 22.170.050, 22.206.090, 22.206.130, 22.206.160, 22.208.020, 22.502.016, 22.801.030, 25.09.100, 25.09.110, 25.09.120, 25.09.220, and 25.09.520 of the Seattle Municipal Code; repealing Chapters 22.100 and 22.110 and Subtitles IA, III, IV, IVA, and IVB of Title 22 of the Seattle Municipal Code; and repealing ordinances or sections of the following ordinances that adopted or amended older editions of construction codes: 117723, 118654, 119478, 121865, 125156, 125157, 125158, 125160, 125161, 125162, 125337, 125408, 125409, 125410, and 125588.

The Committee recommends that City Council pass the Council Bill (CB).
In Favor: 4 - Strauss, Mosqueda, Lewis, Pedersen
Opposed: None
Absent(NV): 1 - Juarez

Attachments:

Att A - 2020 Seattle Boiler and Pressure Vessel Code
Att B - Amendments to 2018 International Building Code
Att C - Amendments to 2020 National Electrical Code
Att D - Amendments to 2018 International Existing Building Code
Att E - Amendments to 2018 International Fuel Gas Code
Att F - Amendments to 2018 International Mechanical Code
Att G - Amendments to 2018 Uniform Plumbing Code
Att H - Amendments to 2018 International Residential Code

Supporting Documents:

Summary and Fiscal Note
Summary Att A – Code Reviser's Statement on RCW 35.21.180

32. CB 119993

AN ORDINANCE relating to Seattle's construction codes; adopting the Seattle Energy Code and chapters of the Washington Administrative Code by reference and amending certain chapters of the Code; amending Section 22.101.010 of the Seattle Municipal Code; repealing Title 22, Subtitle VII of the Seattle Municipal Code; and repealing Sections 2 through 10 of Ordinance 125159 and Section 5 of Ordinance 125410.

The Committee recommends that City Council pass as amended the Council Bill (CB).
In Favor: 4 - Strauss, Mosqueda, Juarez, Lewis
Opposed: None
Abstain: 1 - Pedersen

Attachments: Att A - Amendments to 2018 Washington State Energy Code v3

Supporting Documents:

Summary and Fiscal Note

Summary Att A - Code Reviser's Statement

33. CF 314461

Application of Martin Liebowitz and 34th and Spring, LLC for an extension of the contract rezone of the property at 1106 34th Avenue. Original contract rezone application approved through CF 314325 and Ordinance 125433.

The Committee recommends that City Council grant the Application.
In Favor: 5 - Strauss, Mosqueda, Juarez, Lewis, Pedersen
Opposed: None

Attachments:

Extension Request

Recommendation 3036784-LU (10/29/20)

Central Staff Memo

34. CB 119987

AN ORDINANCE approving the extension of a contract rezone approved by Ordinance 125433 and accepting an amended Property Use and Development Agreement for a property located at 1106 34th Avenue. (Petition by Martin Leibowitz, C.F. 314461, SDCI Project 3036784-LU)

The Committee recommends that City Council pass the Council Bill (CB).
In Favor: 5 - Strauss, Mosqueda, Juarez, Lewis, Pedersen
Opposed: None

Attachments: Ex A – Amended PUDA

Supporting Documents: Summary and Fiscal Note
Proposed Substitute

SELECT COMMITTEE ON HOMELESSNESS STRATEGIES AND INVESTMENTS:

35. Res 31987

A RESOLUTION sponsoring the King County Regional Homelessness Authority's application for membership to the Association of Washington Cities Risk Management Service Agency.

The Committee recommends that City Council adopt the Resolution (Res).
In Favor: 8 - Lewis, Herbold, González , Juarez, Morales, Mosqueda, Pedersen, Strauss
Opposed: None

Supporting Documents: Summary and Fiscal Note

SUSTAINABILITY AND RENTERS' RIGHTS COMMITTEE:

36. Appt 01780

Reappointment of ChrisTiana ObeySumner as member, Seattle Renters' Commission, for a term to February 28, 2021.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 3 - Sawant, Morales, Lewis
Opposed: None
Absent(NV): 1 - Pedersen

Attachments: Appointment Packet

37. Appt 01781 Reappointment of Laurie Goff as member, Seattle Renters' Commission, for a term to February 28, 2021.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 3 - Sawant, Morales, Lewis
Opposed: None
Absent(NV): 1 - Pedersen

Attachments: Appointment Packet

38. Appt 01782 Reappointment of Marcedes T. Taitt-Lamar as member, Seattle Renters' Commission, for a term to February 28, 2022.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 3 - Sawant, Morales, Lewis
Opposed: None
Absent(NV): 1 - Pedersen

Attachments: Appointment Packet

39. Appt 01783 Appointment of Sharon E. Crowley as member, Seattle Renters' Commission, for a term to February 28, 2022.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 3 - Sawant, Morales, Lewis
Opposed: None
Absent(NV): 1 - Pedersen

Attachments: Appointment Packet

40. Appt 01784 Appointment of Maya Garfinkel as member, Seattle Renters' Commission, for a term to February 28, 2023.

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 3 - Sawant, Morales, Lewis
Opposed: None
Absent(NV): 1 - Pedersen

Attachments: Appointment Packet

J. ADOPTION OF OTHER RESOLUTIONS

K. OTHER BUSINESS

L. ADJOURNMENT

Legislation Text

File #: Min 317, **Version:** 1

January 25, 2021

SEATTLE CITY COUNCIL

600 Fourth Ave. 2nd Floor
Seattle, WA 98104

Journal of the Proceedings of the Seattle City Council

Monday, January 25, 2021

2:00 PM

Remote Meeting. Call 253-215-8782; Meeting ID: 586 416 9164; or Seattle Channel online.

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Chair Info:206-684-8809; Lorena.González@seattle.gov

In-person attendance is currently prohibited per Washington State Governor's Proclamation 20-28.15, until the COVID-19 State of Emergency is terminated or Proclamation 20-28 is rescinded by the Governor or State legislature. Meeting participation is limited to access by telephone conference line and online by the Seattle Channel.

A. CALL TO ORDER

The City Council of The City of Seattle met remotely pursuant to Washington State Governor's Proclamation 20-28.15, and guidance provided by the Attorney General's Office, on January 25, 2021, pursuant to the provisions of the City Charter. The meeting was called to order at 2:01 p.m., with Council President González presiding.

B. ROLL CALL

The following Councilmembers were present and participating electronically:

Present: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Absent: 1 - Juarez

C. PRESENTATIONS

Councilmember González read a Proclamation honoring Louise Chernin and proclaiming Sunday, January 31, 2021 Louise Chernin Day. By unanimous consent, the Council Rules were suspended to allow Mark Rosén, Greater Seattle Business Association, to address the Council.

D. APPROVAL OF THE JOURNAL

Min 316 **January 19, 2021**

Motion was made, duly seconded and carried, to adopt the proposed Minutes by the following vote, and the President signed the Minutes:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

E. ADOPTION OF INTRODUCTION AND REFERRAL CALENDAR

IRC 287 **January 25, 2021**

ACTION 1:

Motion was made and duly seconded to adopt the proposed Introduction and Referral Calendar.

ACTION 2:

Motion was made by Councilmember Sawant, duly seconded and carried, to amend the proposed Introduction and Referral Calendar by introducing Appointments 01783 and 01784, and by referring them to the Sustainability and Renters' Rights Committee.

Appointment 01783, Appointment of Sharon E. Crowley as member, Seattle Renters' Commission, for a term to February 28, 2022.

Appointment 01784, Appointment of Maya Garfinkel as member, Seattle Renters' Commission, for a term to February 28, 2023.

ACTION 3:

Motion was made and duly seconded to adopt the proposed Introduction and Referral Calendar as amended.

The Motion carried, and the Introduction & Referral Calendar (IRC) was adopted as amended by the following vote:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

F. APPROVAL OF THE AGENDA

Motion was made, duly seconded and carried, to adopt the proposed Agenda.

G. PUBLIC COMMENT

By unanimous consent, the Council Rules were suspended to provide a 30 minute Public Comment period.

The following individuals addressed the Council:

Claire Irelan
Faye Guenther
Taylor Farley
Charlie Lapham
Amy Fields
David Corliss
Catherine Holm
Shane Stauffer
Patrick King
Sam Dancy
Taylor Gardner
Colton Peterson
Holly Chisa
Brittney Bollay
Joe Kunzler
Sarah Cherin
Elena Perez

H. PAYMENT OF BILLS

CB 119991 **AN ORDINANCE appropriating money to pay certain audited claims for the week of January 11, 2021 through January 15, 2021 and ordering the payment thereof.**

Motion was made and duly seconded to pass Council Bill 119991.

The Motion carried, the Council Bill (CB) was passed by the following vote, and the President signed the Council Bill (CB):

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

I. COMMITTEE REPORTS

TRANSPORTATION AND UTILITIES COMMITTEE:

1. CB 119980 **AN ORDINANCE relating to the City Light Department; authorizing the acceptance of the Statutory Warranty Deed for the "Glacier View Ranch Property" in Skagit County, Washington; placing said land under the jurisdiction of the City Light Department; and ratifying and confirming certain prior acts.**

The Committee recommends that City Council pass the Council Bill (CB).
In Favor: 5 - Pedersen, Strauss, González , Herbold, Morales
Opposed: None

The Council Bill (CB) was passed by the following vote, and the President signed the Council Bill (CB):

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

2. Appt 01720 **Appointment of Anne Ayre as member, City Light Review Panel, for a term to September 30, 2022.**

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Pedersen, Strauss, González , Herbold, Morales
Opposed: None

The Appointment (Appt) was confirmed by the following vote:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

3. Appt 01721 **Reappointment of John Putz as member, City Light Review Panel, for a term to September 30, 2022.**

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Pedersen, Strauss, González , Herbold, Morales
Opposed: None

The Appointment (Appt) was confirmed by the following vote:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

4. Appt 01722 **Appointment of Sandro R. Pani as member, Seattle Transit Advisory Board, for a term to August 2, 2022.**

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Pedersen, Strauss, González , Herbold, Morales
Opposed: None

The Appointment (Appt) was confirmed by the following vote:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

5. Appt 01723 **Appointment of Emily Walton Percival as member, Seattle Transit Advisory Board, for a term to August 2, 2022.**

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Pedersen, Strauss, González , Herbold, Morales
Opposed: None

The Appointment (Appt) was confirmed by the following vote:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

6. Appt 01724 **Reappointment of Andrew P. Martin as member, Seattle Transit Advisory Board, for a term to August 2, 2022.**

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Pedersen, Strauss, González , Herbold, Morales
Opposed: None

The Appointment (Appt) was confirmed by the following vote:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

7. Appt 01725 **Reappointment of Kashina Groves as member, Seattle Bicycle Advisory Board, for a term to August 31, 2022.**

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Pedersen, Strauss, González , Herbold, Morales
Opposed: None

The Appointment (Appt) was confirmed by the following vote:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

8. Appt 01726 **Reappointment of Meredith Hall as member, Seattle Bicycle Advisory Board, for a term to August 31, 2022.**

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Pedersen, Strauss, González , Herbold, Morales
Opposed: None

The Appointment (Appt) was confirmed by the following vote:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

9. Appt 01727 **Reappointment of Patrick W. Taylor as member, Seattle Bicycle Advisory Board, for a term to August 31, 2022.**

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Pedersen, Strauss, González , Herbold, Morales
Opposed: None

The Appointment (Appt) was confirmed by the following vote:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

10. Appt 01728 **Appointment of Jennifer Lehman as member, Seattle Pedestrian Advisory Board, for a term to March 31, 2022.**

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Pedersen, Strauss, González , Herbold, Morales
Opposed: None

The Appointment (Appt) was confirmed by the following vote:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

11. Appt 01729 **Appointment of Emily A. Mannetti as member, Seattle Pedestrian Advisory Board, for a term to March 31, 2022.**

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Pedersen, Strauss, González , Herbold, Morales
Opposed: None

The Appointment (Appt) was confirmed by the following vote:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

12. Appt 01730 **Appointment of Peaches Thomas as member, Seattle School Traffic Safety Committee, for a term to March 31, 2023.**

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Pedersen, Strauss, González , Herbold, Morales
Opposed: None

The Appointment (Appt) was confirmed by the following vote:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

13. Appt 01749 **Appointment of Femi Adebayo as member, Community Technology Advisory Board, for a term to December 31, 2022.**

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Pedersen, Strauss, González , Herbold, Morales
Opposed: None

The Appointment (Appt) was confirmed by the following vote:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

14. Appt 01750 **Appointment of Leah Shin as member, Community Technology Advisory Board, for a term to December 31, 2022.**

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Pedersen, Strauss, González , Herbold, Morales
Opposed: None

The Appointment (Appt) was confirmed by the following vote:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

15. Appt 01751 **Reappointment of Rene J. Peters, Jr. as member, Community Technology Advisory Board, for a term to December 31, 2022.**

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Pedersen, Strauss, González , Herbold, Morales
Opposed: None

The Appointment (Appt) was confirmed by the following vote:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

16. Appt 01764 **Appointment of Nicole Joy Espy as member, Community Technology Advisory Board, for a term to December 31, 2021.**

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Pedersen, Strauss, González , Herbold, Morales
Opposed: None

The Appointment (Appt) was confirmed by the following vote:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

17. Appt 01765 **Reappointment of Brandon Lindsey as member, Community Technology Advisory Board, for a term to December 31, 2022.**

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Pedersen, Strauss, González , Herbold, Morales
Opposed: None

The Appointment (Appt) was confirmed by the following vote:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

18. Appt 01766 **Reappointment of Lassana Magassa as member, Community Technology Advisory Board, for a term to December 31, 2022.**

The Committee recommends that City Council confirm the Appointment (Appt).
In Favor: 5 - Pedersen, Strauss, González , Herbold, Morales
Opposed: None

The Appointment (Appt) was confirmed by the following vote:

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

FINANCE AND HOUSING COMMITTEE:

19. CB 119990 **AN ORDINANCE relating to employment in Seattle; establishing labor standards requirements for additional compensation for grocery employees working in Seattle; amending Sections 3.02.125 and 6.208.020 of the Seattle Municipal Code; declaring an emergency; and establishing an immediate effective date; all by a 3/4 vote of the City Council.**

The Committee recommends that City Council pass as amended the Council Bill (CB).
In Favor: 5 - Mosqueda, Herbold, González , Lewis, Strauss
Opposed: None

The Council Bill (CB) was passed by the following vote, and the President signed the Council Bill (CB):

In Favor: 8 - González , Herbold, Lewis, Morales, Mosqueda, Pedersen, Sawant, Strauss

Opposed: None

J. ADOPTION OF OTHER RESOLUTIONS

There were none.

K. OTHER BUSINESS

There was none.

L. ADJOURNMENT

There being no further business to come before the Council, the meeting was adjourned at 3:39 p.m.

Jodee Schwinn, Deputy City Clerk

Signed by me in Open Session, upon approval of the Council, on February 1, 2021.

M. Lorena González, Council President of the City Council

Monica Martinez Simmons, City Clerk

Legislation Text

File #: IRC 288, **Version:** 1

February 1, 2021

SEATTLE CITY COUNCIL

February 01, 2021

Introduction and Referral Calendar

List of proposed Council Bills (CB), Resolutions (Res), Appointments (Appt) and Clerk Files (CF) to be introduced and referred to a City Council committee

Record No.	Title	Committee Referral
By: Mosqueda		
1. CB 119994	AN ORDINANCE appropriating money to pay certain audited claims for the week of January 18, 2021 through January 22, 2021 and ordering the payment thereof.	City Council
By: Mosqueda		
2. Appt 01785	Appointment of Rita Howard as member, Seattle Housing Authority Board, for a term to March 20, 2023.	Finance and Housing Committee
By: Mosqueda		
3. Appt 01786	Appointment of Jaimée Marsh as member, Sweetened Beverage Tax Community Advisory Board, for a term to August 31, 2021.	Finance and Housing Committee
By: Mosqueda		
4. Appt 01787	Appointment of Munira Mohamed as member, Sweetened Beverage Tax Community Advisory Board, for a term to August 31, 2023.	Finance and Housing Committee
By: Pedersen		
5. Res 31988	A RESOLUTION granting conceptual approval to construct, maintain, and operate a private parking area on East Howe Street, east of Fairview Avenue East; as proposed by BSOP 1, LLC, as part of developing a public plaza in unopened right-of-way in the Eastlake neighborhood.	Transportation and Utilities Committee
By: Pedersen		
6. Appt 01788	Appointment of Dennis Gathard as member, Levy to Move Seattle Oversight Committee, for a term to December 31, 2023.	Transportation and Utilities Committee

File #: CB 119994, **Version:** 1

CITY OF SEATTLE

ORDINANCE _____

COUNCIL BILL _____

AN ORDINANCE appropriating money to pay certain audited claims for the week of January 18, 2021 through January 22, 2021 and ordering the payment thereof.

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. Payment of the sum of $15,132,215.81 on PeopleSoft 9.2 mechanical warrants numbered 4100427109 - 4100428704 plus manual or cancellation issues for claims, E-Payables of $22,561.15 on PeopleSoft 9.2 9100008298 - 9100008328 and Electronic Financial Transactions (EFT) in the amount of $26,429,819.88 are presented for ratification by the City Council per RCW 42.24.180.

Section 2. Payment of the sum of $51,180,319.70 on City General Salary Fund mechanical warrants numbered 51342418- 51342808 plus manual warrants, agencies warrants, and direct deposits numbered 40001-42676 representing Gross Payrolls for payroll ending date January 19, 2021 as detailed in the Payroll Summary Report for claims against the City which were audited by the Auditing Committee and reported by said committee to the City Council January 28, 2021 consistent with appropriations heretofore made for such purpose from the appropriate Funds, is hereby approved.

Section 3. Any act consistent with the authority of this ordinance taken prior to its effective date is hereby ratified and confirmed.

Section 4. This ordinance shall take effect and be in force 30 days after its approval by the Mayor, but if not approved and returned by the Mayor within ten days after presentation, it shall take effect as provided by Seattle Municipal Code Section 1.04.020.

Passed by the City Council the 1st day of February 2021, and signed by me in open session in authentication of its passage this 1st day of February 2021.

_____

President _____ of the City Council

Approved / returned unsigned / vetoed this _____ day of _____, 2021.

_____

Jenny A. Durkan, Mayor

Filed by me this _____ day of _____, 2021.

_____

Monica Martinez Simmons, City Clerk

(Seal)

Legislation Text

File #: Appt 01757, **Version:** 1

Appointment of Curry Mayer, Director of the Office of Emergency Management.

The Appointment Packet is provided as an attachment.

City of Seattle

Director
Office of Emergency Management

Confirmation Packet
December 22, 2020

Curry Mayer

City of Seattle
Mayor Jenny A. Durkan

December 22, 2020

The Honorable M. Lorena González
President, Seattle City Council
Seattle City Hall, 2nd Floor
Seattle, WA 98104

Dear Council President González:

I am pleased to transmit to the City Council the following confirmation packet for my appointment of Curry Mayer as Director of the Office of Emergency Management.

The materials in this packet are divided into two sections:

A. Curry Mayer
This section contains Ms. Mayer's appointment and oath of office forms, her resume, and the press release announcing her appointment.

B. Background Check
This section contains the report on Ms. Mayer's background check.

Curry Mayer will join the City with over 20 years of emergency management experience at the local, state, national levels. Most recently, Curry served as Emergency Manager for the City of Bellevue, overseeing the design and implementation of comprehensive emergency management programs. She has considerable local government experience and knowledge of regional relationships. At the City of Bellevue, Curry led a diverse team and has extensive experience encouraging communities to take a proactive stance towards emergency preparedness.

I am particularly excited about Curry's knowledge of the area – the threats we face and the partnerships we have with federal, state, and other local governments, and I know that she will lead with a lens towards racial equity, as she has in Bellevue.

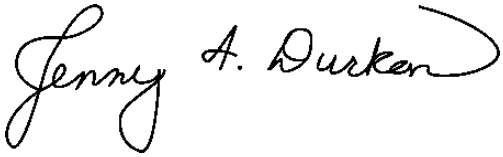
Through the search process, my priority was finding a leader who carried those qualities. We worked with the Seattle Department of Human Resources to conduct a public recruitment process and reached out to emergency management networks, regionally and nationally. We

engaged local stakeholders as part of the selection committee, including OEM staff, volunteers, and partners such as Harborview Medical Center.

My nomination of Curry as Director represents my vision for the new, independent Office of Emergency Management and I urge you to confirm her.

If you have any questions about the attached materials or need additional information, please contact Senior Deputy Mayor Mike Fong at 206-256-6191.

Sincerely,



Jenny A. Durkan
Mayor of Seattle

SECTION

A

City of Seattle
Mayor Jenny A. Durkan

December 16, 2020

Curry Mayer
Bellevue, WA
Transmitted via e-mail

Dear Curry,

It gives me great pleasure to appoint you to the position of Director of the Office of Emergency Management at an annual salary of $157,000.

Your appointment as Director is subject to City Council confirmation; therefore, you will need to attend the Council's confirmation hearings. Once confirmed by the City Council, you serve at the pleasure of the Mayor

Your contingent offer letter provided employment information related to the terms of your employment, benefits, vacation, holiday and sick leave.

I look forward to working with you in your role as Director and wish you success. We have much work ahead of us, and I am confident that the Office of Emergency Management will thrive under your leadership.

Sincerely,

Jenny A. Durkan

Jenny A. Durkan
Mayor of Seattle

cc: Seattle Department of Human Resources file

City of Seattle Department Head Notice of Appointment

Appointee Name: *Curry Mayer*	
City Department Name: *Office of Emergency Management*	**Position Title:** *Director*
☒ **Appointment** ***OR*** ☐ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No
Appointing Authority: ☐ Council ☒ Mayor ☐ Other: *Specify appointing authority*	**Term of Office:** *City Council Confirmation* to *Direction of the Mayor*
Legislated Authority: *Seattle Municipal Code Section 3.15.042*	
Background: Curry Mayer will join the City with over 20 years of emergency management experience at the local, state, national levels. Most recently, Curry served as Emergency Manager for the City of Bellevue, overseeing the design and implementation of comprehensive emergency management programs. She has considerable local government experience and knowledge of regional relationships. At the City of Bellevue, Curry led a diverse team and has extensive experience encouraging communities to take a proactive stance towards emergency preparedness.	

Date of Appointment: *12/22/2020*	**Authorizing Signature (original signature):** Jenny A. Durkan	**Appointing Signatory:** *Jenny A. Durkan* *Mayor*

CITY OF SEATTLE ▪ STATE OF WASHINGTON

OATH OF OFFICE

State of Washington

County of King

I, Curry Mayer, swear or affirm that I possess all the qualifications prescribed in the Seattle City Charter and the Seattle Municipal Code for the position of Director of the Office of Emergency Management; that I will support the Constitution of the United States, the Constitution of the State of Washington, and the Charter and Ordinances of The City of Seattle; and that I will faithfully conduct myself as *Director of the Office Emergency Management*.

_____
Curry Mayer

Subscribed and sworn to before me

this ____ day of _____, 2021. [Seal]

_____
Monica Martinez Simmons, City Clerk

CURRY MAYER

[redacted]Bellevue, WA 98008

EXPERIENCE

CITY OF BELLEVUE, WA

Emergency Manager *November 2016 – present*
Lead City's response to COVID-19; full EOC activation, both in-person and remotely. Manage and lead a diverse team of emergency management professionals in the development and implementation of policies, plans, and practices to ensure effective and efficient emergency preparedness, mitigation, response and recovery activities. Advise the City Manager and City Council on emergency management issues. Direct and oversee the Emergency Management Division's strategic goals which set the foundation for building a resilient city. Actively participate in engagement activities to reach all communities, especially underserved communities of color and of limited English proficiency. Manage city's Emergency Operations Board consisting of all Department Directors for emergency management policy issues. Manage the Emergency Operations Center in exercises and real incident activations. Established Private Sector Advisory Network. Foundational member of Functional Assessment Service Team (FAST) for King County. Serve as regional leader on unified command and exercise development task forces as part of the Complex Coordinated Terrorist Attack project. Board Vice President for the Washingt*on 211 Information Network,* Chair of the Homeland Security & Emergency Management Center of Excellence Board, King County Emergency Management Advisory Committee (EMAC) Chair, Critical Infrastructure Workgroup.

California Department of Food & Agriculture

Emergency Management Advisor to the Undersecretary *June 2014 – October 2016*
Advisor to the Undersecretary, ensuring the implementation of the incident command system to respond to and recover from agricultural disasters throughout California. Served as subject matter expert on all aspects of emergency issues pertaining to agriculture security. Directed the Agency emergency mitigation, response and recovery activities including implementation of policies and procedures that were consistent with state and federal legislation. Coordinated the CA Animal Response Emergency System, a network of private and not-for-profit resources in support of animal rescue and sheltering. Lead activities in support of State Emergency Function (EF) 11, Food & Agriculture. State agency liaison for four state EOC activations in response to wildfires. Member of Governor's Drought Task Force. Managed the development of the CDFA continuity of operations plan.

California Governor's Office of Emergency Services 1997-2016

Performed in a number of leadership positions throughout the State to include:

Director, CA Specialized Training Institute *September 2007- June 2010 – Training & Exercise Branch, San Luis Obispo & Sacramento, CA*
As a member of Executive Management Team of the Governor's Office of Emergency Services (OES) provided leadership, planning, coordination and management of the Training Institute. Managed 35 instructional and administrative staff in San Luis Obispo and in Sacramento for the design, development, and implementation of training and exercises for emergency management and homeland security professionals and the private sector

throughout California. Administered the Branch's budget of between $2.8 and $3.2 million per year. Managed all programs at CSTI to deliver training to over 7,000 emergency responders throughout the state. Advisor to the OES Director, ensuring the implementation of the Standardized Emergency Management System protocols and procedures, used by all levels of government throughout California. Served in the State Operations Center during numerous disaster activation; assigned as the State Operations Center Director and Planning Section Chief, and hold CA certifications in those positions.

Chief, Training Branch *June 2010 – 2014 –Sacramento, CA* Managed and directed staff to design, develop and implement emergency management training programs, including exercises for state agencies, local government and the private sector in support of their responsibilities in preparedness, response, mitigation, prevention and recovery. Provided technical expertise to state agencies, special districts, and local government on development of their emergency operations plans and programs. Policy development and revision related to Agency wide emergency management training and exercises. Coordination and collaboration with Executive Staff on ensuring a continuous delivery of comprehensive emergency management activities. State Operations Center Director and Plans Chief credentials and experience. Key partner with federal, state, county, and city governments, the private sector, and NGO's throughout the State.

Chief, & Executive Liaison *August 2006-September 2007 – Training & Exercises* - As State Exercise Officer, was responsible for the Standardized Emergency Management System (SEMS) and National Incident Management System (NIMS) integration, and was State point of contact with the NIMS Integration Center. Additionally, responsible for the Statewide Exercise Strategy plan. Chair of the SEMS Training & Exercise Specialist Committee, California's representative on the National Incident Management System's Training Working Training. Responsible for State Agency Training to include; curriculum development, course management, coordination of logistics and instructor support. **Executive Liaison to the Director -** Responsible for Cabinet level tabletop exercises in emergency management, member of the Governor's Emergency Operations Executive Committee (GEOEC), served as subject matter expert in SEMS, Coordinated presentations, speeches, and high level meetings for the Director, special projects as needed.

Instructor I & II, *May 1998 – August 2006*Taught emergency management courses throughout CA to all levels of government, the private sector, and NGO's. Standardized Emergency Management System (SEMS) Training and Exercise Specialist Committee Chair, Course manager and instructor a variety of emergency management courses. Budget development for emergency management and customized courses. Member of OES Director's Strategic Management Committee; Participant in Program Development activities, such as strategic planning, graphics, need assessments, and special projects.

Emergency Services Coordinator *March 1997 – May 1998* Performed multiple complex, planning, operational (response), technical and analytical duties in Federal and State programs in all phases of emergency services activity. Provided planning assistance to political subdivisions by helping to develop and monitor single-year and multi-year comprehensive work plans, & mutual aid agreements; wrote multi-hazard emergency plans, service annexes, contingency plans, SOP's and comprehensive resource lists. Conducted hazard identification and hazard analysis studies; designed, analyzed, and evaluated exercises; reviewed proposals; conducted briefings and presentations on emergency management issues. Served as state agency representative for Diablo Canyon Nuclear Power Plant to include exercise design and participation.

Booz-Allen & Hamilton Inc. | Washington, D.C. & McClean, VA

October 1991- March 1997

Senior member of project/training staff for the White House Military Office's Executive Support Contingency Operations and Readiness Training (ESCORT) course; a weapons of mass destruction (WMD) protection of the

Chief Executive program. Supported the Department of the Army's Continuity of Operations programs including; analysis of crisis management systems, conference management, scenario and exercise development, creation of training materials, and supervision of administrative support staff, evaluator of Department of the Army classified exercises. Developed and presented ICS workshop for U.S. Congress. Designed and conducted professional development courses to national and international employees in the following areas: supervisory skills, conflict management, interviewing skills, presentation skills, customer service skills, and business writing. Developed and implemented training programs for four small firms to include; supervisory skills, conflict management, program management, and performance appraisal systems. Authored employee handbook and personnel appraisal guidelines; conducted United Nations marketing effort to establish crisis coordination centers; wrote required operational capabilities document in support of National Guard Bureau's Emergency Management System; and authored training section of successful Air Force arms control training initiative. ***Top Secret Security Clearance.***

SKILLS

- Contributing Author on InfraGard book on Building Community Resilience following a widespread power outage
- Master Exercise Practitioner Program (MEPP) Certification (Practitioner and Instructor)
- Homeland Security Exercise Evaluation Program (HSEEP) Certified
- Credentialed State Operations Center Director, & Plans Chief (California)
- FEMA professional development series
- Emergency Operations Center (EOC) Instructor & Practitioner
- Practitioner & Instructor, Incident Command System (ICS) & the National Incident Management System (NIMS)
- Proficient in curriculum instruction, design and development

UNIVERSITY OF PHOENIX

October 2010, Med

CA State University, Long Beach

May 1985 B.A., Speech Communications

FACULTY POSITIONS

Adjunct Faculty
Pierce Community College – Homeland Security Emergency Management

National University – School of Professional Studies
Crisis Response Planning and Management - online

CA State University Long Beach
Master's degree program of Emergency Services Administration
Online

City of Seattle
Mayor Jenny A. Durkan

NEWS RELEASE FROM THE OFFICE OF THE MAYOR

Contact: Kamaria Hightower, Kamaria.Hightower@seattle.gov

Mayor Durkan Announces Leadership Updates at Emergency Management, Human Services, and Arts and Culture

SEATTLE (December 4, 2020) – Seattle Mayor Jenny A. Durkan today announced several leadership changes, including the appointment of Curry Mayer as Director of the Office of Emergency Management (OEM), Helen Howell as Interim Director of the Human Services Department (HSD), and Calandra Childers as Interim Director of the Office of Arts & Culture (ARTS). HSD Director Jason Johnson and ARTS Director Randy Engstrom will depart in January 2021.

Curry Mayer will join the City with over 20 years of emergency management experience at the local, state, national levels. Most recently, Mayer served as Emergency Manager for the City of Bellevue, overseeing the design and implementation of comprehensive emergency management programs. She has considerable local government experience and knowledge of regional relationships. At the City of Bellevue, Mayer led a diverse team and has extensive experience encouraging communities to take a proactive stance towards emergency preparedness. As OEM Director, Mayer will ensure the City's emergency response advances through a lens of inclusivity, centering underserved populations, and will join the City in December 2020.

"2020 has been a year of immense challenges including the COVID-19 pandemic, but the City has undergone other emergencies including the closure of the viaduct and the largest snowstorm in 50 years. Our Office of Emergency Management plays a key role in coordinating and preparing for disasters and emergencies facing our city. OEM – working with all our departments – will help our City recovery more equitably," said Mayor Durkan. "As Curry begins this new role, I am grateful to Acting Director Laurel Nelson and the entire OEM staff who have helped navigate an unprecedented year."

"Seattle has a proud history of excellence in emergency management, exhibited most profoundly by leading the nation with its COVID-19 emergency response. Thank you, Mayor Durkan. I am honored to step into the leadership role of this great agency with such talented

staff and I look forward to working across departments to help spearhead a resilient and equitable post-COVID recovery," said Mayer.

HSD Director Jason Johnson had previously announced his departure from the City. However, with the onset of COVID-19, Johnson graciously extended his time, implementing groundbreaking policies to stabilize the city's most vulnerable residents including expanding shelter resources and services for people experiencing homelessness, streamlining emergency food access, and helping maintain critical services for aging and disabled residents throughout the pandemic. Over a seven-year period, Johnson led the City through the largest shelter expansion in history, a 77 percent increase in enhanced 24/7 shelter, and the development and implementation of the King County Regional Homelessness Authority. Through his leadership, the City increased funding for community-based organizations working to improve community safety, supportive services for youth and families, and launched the Age-Friendly Seattle Initiative and the award-winning Health One program in partnership with the Seattle Fire Department.

"Jason and his team have done incredible work to ensure our neighbors furthest from equity have access to critical resources. With his help and guidance, the King County Regional Governance Authority is moving forward and will be the conduit for transformational change in the lives of people experiencing homelessness throughout our region, and we have transformed our shelter system to serve more people with 24/7 services, which will be expanded even further in the coming months," said Mayor Durkan. "I'm grateful that he chose to stay and support our city during the most challenging time in our history. His quick and decisive actions kept our most marginalized communities safe throughout the pandemic. Because of his vision and leadership, the Human Services Department is primed to build on these efforts for years to come."

"Over the last seven years, I have had the privilege of working alongside the most dedicated people in public service. Thank you to Mayor Jenny Durkan for her leadership, my cabinet colleagues for their continued support and partnership, and HSD staff for the mission-driven work they do every day that literally saves lives," said Johnson.

Mayor Durkan has appointed Helen Howell as Interim Director of HSD. Howell most recently held the position of Senior Director of Policy, Research & Social Impact Initiatives at the King County Housing Authority, while also overseeing Homeless Housing Initiatives and the Housing Choice Voucher Program. Prior to that, Howell served as the Executive Director of Building Changes, a Seattle nonprofit focused on reducing youth and family homelessness across the state. Howell enters the City with more than three decades of experience in public policy, advocacy, and leadership. Howell's tenure will be on an interim basis while the City embarks on an inclusive, nationwide search for the permanent director. Incoming Deputy Mayor Tiffany Washington, current Deputy Director of the Department of Education and Early Learning and formerly the head of the Homelessness Services Investments division, will lead the

recruitment process and will announce the next steps for the search process in 2021 after working with employees. Howell will assume the Interim Director role in January 2021.

Director Randy Engstrom is stepping down after eight years leading the Office of Arts & Culture. He will turn his attention to teaching, advocating for national cultural policies, and spending time with his family. In his eight years at ARTS, Director Engstrom has overseen several initiatives, including working to establish the Cultural Space Agency, the first cultural space affordability and anti-displacement program in the country; opening ARTS at King Street Station, a community-led exhibition space in King Street Station, opening with yəhaw' an exhibition that featured more than 100 Indigenous creatives; launching and implementing The Creative Advantage, ARTS' comprehensive partnership with Seattle Public Schools to restore arts education to every student in the District; and establishing ARTS as a national model on the strength of its staff, from a relentlessly innovative cultural investment team to an award-winning public art program.

"Randy has always been such a dedicated and passionate advocate for arts in our city, and under his leadership, the City supported countless nonprofits, artists, and cultural organizations, created a new home at King Street Station and new cultural districts across the city, and supported relief for artists and nonprofits in this immensely challenging year," said Mayor Durkan. "The Office of Arts & Culture is at the forefront of the creative economy, pushes to invest in our Black, Indigenous, and People of color communities, and continues to lead one the nation's most innovative public art programs. In the coming year, their work will be central as we commit ourselves to an equitable recovery that centers our most vulnerable communities, including our workers and artists who have lost so much during COVID-19."

"It has been the honor of my career to lead the Office of Arts & Culture for the past eight years. To every artist and cultural worker in Seattle and the vast, brilliant, and resilient cultural sector in our region; you are the center of all of the work we do," said Engstrom. "As our city entered the myriad of crises that defined 2020 - COVID, economic collapse, and racial justice reckoning, I am proud to be part of the Durkan administration which seeks to re-imagine the way we do our work as a government. I am humbled and hopeful that the City may co-create a more equitable, creative, and sustainable city for future generations."

Mayor Durkan announced that Calandra Childers will serve as Interim ARTS Director, effective February 1, 2021. Childers, who joined ARTS in 2012, currently serves as the Deputy Director. Mayor Durkan will announce the next steps for a permanent leader of Seattle's Office of Arts & Culture in 2021.

###

SECTION

B

Seattle Department of
Human Resources
Jenny A. Durkan, Mayor
Bobby Humes, Director

CONFIDENTIAL MEMORANDUM

Date: **December 16, 2020**

To: Pam Inch
SDHR – Executive Recruiter

From: Ebony Thomas
SDHR – Recruiting & Compliance Analyst

Subject: **Confidential Background Report Results**
Curry Mayer
Director- OEM

Global Screening Solutions background check reported no areas of concern. The candidate is eligible to start work.

Experience and Vision

1. Why did you want this job? What do you want to accomplish during your tenure? How will you know if you're successful?

I am very passionate about emergency management, having a positive impact, and helping people.

There are many components necessary for emergency management to be successful and I believe that Seattle government has those:

- A commitment to racial and social justice – values of Inclusion, learning, accountability and stewardship
- A talented and committed OEM Staff
- Belief that government works best when it works collaboratively with the community it serves
- Diversity of thought is valued and encouraged

Seattle is one of the great cities of the world and is known for being innovative – that's exciting! Being part of Seattle government and working toward building community resilience every day is exciting.

I believe that my skills and experience working with so many organizations outside of government and public safety has allowed me to learn how to listen to what a group values and needs and then connect that to emergency management principles, which is really about building community resilience.

Emergency Management is connected to everything and I am good at helping people understand that connection and why we should be partners.

In the short term, I am thankful that I am part off the team that will be deploying vaccines throughout Seattle and in making sure all who are eligible and want the vaccine have access to it.

Long term, I am committed to working with my colleagues in city departments, community leaders, and the private sector to build community resilience, which means working together to address all of the issues that are challenging for daily life. Building resilience will require OEM is able to:

- Build and maintain successful partnerships to address mitigation projects that keep people safe, such as, continued awareness of Unreinforced Masonry (URM) buildings and ways to address their vulnerabilities.
- Engage with community leaders to reach underserved populations, those with limited English proficiency, and other groups with access and functional needs (AFN) to listen to their needs and then partner to help address barriers to building resilience.

- Work with the OEM Team and city departments for reaccreditation through the Emergency Management Accreditation Program (EMAP) which requires validation that all city departments have a role and are engaged in emergency management.
- Continue to engage with city department directors and their teams to plan, prepare for, mitigate and respond to all hazards which may impact Seattle, through a comprehensive training and exercise plan, and the implementation of that plan.
- Response to all emergency incidents with trained OEM staff and in collaboration with the city's operational departments to help those impacted. Leverage the response coordination capabilities with our OEM staff and key partners through the work of the Emergency Operations Center (EOC).
- Address improvement plan actions resulting from the After-Action Review following incidents and exercises.
- Work with the city's Recovery Director and team to help Seattle return to some state of normal not just from COVID, but from all incidents impacting the city. Using that work to build on the foundational work of the City's Disaster Recovery Framework and the Reimagine Seattle work.
- Continue partnerships with Regional Emergency Management Directors strengthening our commitment to each other and enhancement of regional resilience.

2. How has your experience in Bellevue prepared you for this job?

My experience in Bellevue provided me with the opportunity to get to know the issues and challenges in emergency management in the Region. I worked with neighboring jurisdictions and have strong partnerships with regional emergency management directors. I served on several regional committees and Boards, including the Emergency Management Advisory Committee (EMAC) which advises on King County Council, the WA 211 Board, the Critical Infrastructure working group (a public-private partnership). These partnerships are critical for successful emergency management activities.

3. What differences do you anticipate between leading Seattle OEM and your role in Bellevue?

Bellevue is a 51% minority majority city, so the main difference is that Seattle is a much larger city. Size usually means complexity which means there are more distinct communities that make up Seattle and have diverse needs and perspectives.

4. Please describe any lessons you've learned as an emergency management professional from the COVID-19 pandemic. Have you noted any opportunities for improvement at the local level?

The problems, issues and challenges that people face from systemic racism have been exacerbated by the pandemic. So, access to education and childcare, use of technology, healthcare access and housing, employment opportunities -- all things drastically impacted by COVID -- are disproportionately effecting BIPOC communities. This means for emergency management that we must be acutely aware of how our efforts to assist people will also be affected, as daily life activities and support systems are drastically impacted. COVID has re-emphasized what we already knew about messaging, and that is that only using technology as a message delivery system is inadequate and does not reach all communities. Nothing takes the place of face-to-face contact and that isn't possible now. Our use of community partnerships and culture brokers for messaging and to connect people to resources is even

more important than it was previously. COVID has also required that we do a better job of explaining to people what authority public health has, what a public health emergency is and how emergency managers work with public health experts on a regular basis. It would be helpful for local jurisdictions to do more exercises with public health scenarios, especially scenarios that simulate going on for a long period of time. Local government also has the opportunity to help the public understand how important mental health is and that it also impacts people's ability to be resilient. The long length of the pandemic has taken a toll of everyone and it is all of local government's responsibility to recognize that so that collectively we can help each other and continue to support new ways to connect with others.

5. **Do you have any professional experience in responding to or recovering from a major disaster, prior to the COVID-19 pandemic? If so, how will that experience inform your work at Seattle OEM?**

I worked in emergency management in California for over 20 years, where I responded to many large-scale, federally declared disasters. My experience in emergency operations centers for local and state government agencies includes responding to wildland fires, large flood events, inclement weather causing mass power outages and animal disease outbreaks. All responses were multi-agency, multi-jurisdiction incidents lasting 7 days or more. In each of those incidents I served as the Planning Chief responsible for planning support operations to first responders, or as an Agency representative, or as the EOC Director responsible for the entire management of the emergency operations center (EOC). That work has provided me with multiple experiences of using multi-agency coordination through use of the Incident Command System (ICS) and experience developing and implementing Action Plans. These are the standard emergency management roles and responsibilities which adhere to the National ICS standard and would be of benefit to any emergency management organization, as we all adhere to those standards. In those roles I had the opportunity to work with myriad agencies, departments, and disciplines which required that I spend time listening to understand all those involved in the incident's mission and perspective on priorities. All of this work will be of benefit to my work in Seattle.

6. **What opportunities do you see from creation of an independent OEM instead of reporting through the SPD chain of command?**

It's exciting for OEM to become independent for the first time in its existence. Independent OEMs with direct reporting to the executive are able to directly tackle issues without layers of approval. Emergency Management is the core function that brings disparate disciplines together to address problems and identify solutions to consequences needing collaboration and coordination. We know how to bring people together and facilitate discussions, while bringing all voices to the table. We support first responders and work with departments and partners in responding to the impacts to our community. Emergency Management work requires that we bring together many departments, agencies, and disciplines in order to provide the most comprehensive and efficient response to anything that impacts people lives and requires multiple disciplines to work together. Overall situational awareness is possible when each discipline's mission and actions are understood. Emergency Management is also focused on community building through understanding all that community is vulnerable to so that we can focus on preparedness, mitigation, response, and recovery. First responders (like police and

fire) focus on actions immediately following some incident. EM focuses on actions needed before, during, and after an incident.

7. What will be your advice/recommendations to an incoming new mayor in your first briefing?

First, we'll continue our practice of briefing the new Mayor and their leadership team on the response role before they assume office, in case there is an emergency during the transition. From there, it is important for the incoming Mayor to be oriented to the citywide emergency response capability providing confidence on operational plans in place, department operational systems, trained and capable personnel, and policy-level processes and mechanisms. My advice will be for the Mayor to leverage their department directors through the Emergency Executive Board who assist in emergency policy advisement and support routine exercises to help build response muscle memory.

It will be important for the new Mayor to understand OEM's role with respect to COVID response/recovery, the current priorities at that time for OEM and the region, and an update on regional programs and grant work, such as the Catastrophic Planning grant, and the part Seattle plays in that work.

8. What do you see as the City Council's role with respect to emergency management? How will you ensure that you work effectively with the City Council.

OEM has appreciated City Council's support to our citywide emergency management over the years. We will continue to provide you briefings on emergency management efforts and sharing our Strategic Plan intentions. We will also continue to have the Council approve key emergency management plans as well as important grant funding which covers the salaries and benefits of three of our 14 staff. During the disaster response, we value your assistance in sharing key information and emergency communications to your constituents. Also, during and following a disaster, your role is vital in taking action on emergency proclamations and approving emergency budget needs as we work to recover our community. All of you are our force-multipliers in sharing preparedness information and helping to make our community more resilient. I am committed to information sharing and keeping you informed as we address annual priorities and respond to emergencies as they arise.

OEM Role

9. What can OEM and the City do better to build resiliency to endure and recover from disasters?

OEM and the city can continue to seek out groups and individuals to whom we are not currently connected. Then listen to their needs, challenges and perspectives to understand how we can help them strengthen their community, group, or family. By focusing on strengthening people's abilities to deal with daily struggles; whether access to housing, education, jobs, or healthcare, we will also make them more resilient and better able to build resilience and recover from disasters. Strong communities, groups, and families are more resilient which means they are better able to withstand impacts from disasters. This includes a focus on underrepresented groups and those who may simply be unaware of what resources are available, how to access them, and what hazards they are vulnerable to.

10. Given that the City's response to the currently declared emergencies (i.e., homelessness and the COVID-19 pandemic) are not being managed out of OEM, what, if anything, could or should OEM contribute to addressing the response to and/or recovery from these emergencies?

Our Seattle Hazards Identification & Vulnerability Assessment (SHIVA) has identified that the city can face upwards of 18 different hazards. Being prepared and able to respond to such an array of hazards requires our ongoing attention and preparation efforts. We need to address emergency plans, trainings, exercises, prepare and educate the whole community, take steps to mitigate hazard impacts, and maintaining the operational readiness of the city and the Emergency Operations Center. All these efforts require our consistent engagement with departments, agencies, community and regional, state and federal partners.

Emergency Management, while not the lead for these aforementioned emergencies, is actively working with the Departments who are managing their work and responding. OEM provides critical information across and between Departments while maintaining the large situational awareness operational picture of work being done. This operational picture can be used to help identify where the gaps may be.

Recovery, as seen with COVID, is a significant endeavor and leverages similar partners and many other non-response stakeholders. As we have seen in 2020 with multiple emergency events, its critical to maintain a response capability and also dedicate focused resources for recovery.

Recovery requires cross departmental work as well and will build upon the progress made prior to moving into that work.

11.Do you see any strategic opportunities for the City to rebuild to a better place, post-pandemic?

Rather than life after COVID, for a while we will most likely be figuring out how to make life better with COVID. I see strategic opportunities in the following areas:

- Continuing to reimagine how we connect with people outside of the use of technology – and avoid ignoring the digital divide that will continue to impact certain communities.
- Rethinking urban planning and increasing access to all public spaces, basic services, and amenities
- Continuing work on inclusivity with focus on BIPOC businesses and communities
- Reimaging public transportation options
- Providing robust and widespread access to remote learning or providing of options for educational access in partnership with the private sector.
- Addressing how to provide services in conjunction with public health for those without healthcare options.

12. How can OEM improve the City's resiliency to climate change impacts?

Climate change will cause more intense storms, frequent heavy precipitation, heat waves, drought, extreme flooding, and higher sea levels which could significantly alter the types and magnitudes of hazards we face. Over the last few years OEM has worked with several

departments (Office of Sustainability & Environment, Seattle Public Utilities, Seattle Parks & Recreation, Seattle Fire Department, etc.) collaborating on plans and efforts to address the impacts of climate change. OEM has explored and faced ways to lessen the impacts of wildlife smoke, King Tides, excessive heat, and Pineapple Expresses. OEM can improve the City's resilience by engaging City Departments in training and exercising to prepare for, mitigate, respond, and recover from more severe disasters and emergencies. Exercises with severe incident scenarios will also be effective with elected officials, community groups, and with the private sector. Obtaining funding from FEMA for mitigation projects for multiple City Departments will lessen the impact of more severe incidents. This requires OEM to work with state and federal partners to ensure understanding of mitigation grant opportunities and their requirements. Updating Seattle's Threat and Hazard Identification Risk Assessment (THIRA) is a requirement for some grants and provides the City with important information about those incidents we are most vulnerable to, how that vulnerability changes over time, and what impacts are expected so we can prepare appropriately.

Racial Equity

13. How will you address racial equity in preparing for, responding to, and recovering from a disaster?

Racial equity is best addressed by understanding how systemic racism has adversely impacted BIPOC communities, making them less resilient and more susceptible to severe impacts from all hazards. This means that BIPOC communities will need different things to prepare for, respond to and recover from disasters. That understanding comes from engaging with communities through trusted community leaders, using Community Safety Ambassadors, and teaching courses that are meaningful for each group's needs. It means learning about and listening for what a community believes is important and meeting them where they are and not expecting them to come to us. Community preparedness is much more effective than trying to get each individual person to spend time preparing. Emergency Management is most successful in helping communities prepare when time is spent understanding the challenges and issues they face daily. All of the issues BIPOC communities face; access to education, housing, employment, healthcare, and food insecurity make them more vulnerable to disaster impacts, and disasters and emergencies exacerbate those issues. OEM's partnership with other departments to address these daily life issues allows us to be more successful at focusing our preparedness issues on what will make the most sense for a community. Building resilience starts with first addressing those things that a community struggles with every day.

14. What steps have you taken to deepen your understanding of racial equity and how it intersects with emergency management?

I have engaged with the Institute for Diversity & Inclusion in Emergency Management to learn from and connect with those committed to diversity and inclusion. The mission of I-DIEM is to serve as a resource and an advocate for the value of diversity and inclusion in emergency management (EM). I-DIEM leads efforts to increase representation of women and people of color in the field of emergency management, including in positions of leadership, through awareness and education. I-DIEM serves as the conduit for research on diversity and inclusion, social equity and the practical application of equitable EM practices to improve outcomes and

build resilience. The focus is on humanity, and the vision supports the empowerment of marginalized communities within all phases of the disaster management cycle.

I participated in the Leadership Eastside program to learn adaptive leadership techniques and work with a diverse cohort and campaign team. My campaign team work focused on the supporting and embedding of racial equity and social justice concepts and principles into the curriculum and into the work we engaged in with community partners.

15. What do you see as the most effective tools to address racial equity in the field of emergency management?

In the short term, engaging with Culture brokers, community leaders, and neighborhood groups to understand how best to help everyone build resilience.

In the longer term, recruit, mentor, and train BIPOC people to enter the field of emergency management so the field more closely represents the people they serve and work with.

16. How did you incorporate racial equity into your work with the City of Bellevue? Please provide specific examples.

To best reach BIPOC communities, my team and I designed a three-pronged approach:

- We first worked on a needs assessment, by designing and disseminating a survey to ascertain awareness and understanding of emergency preparedness by all communities in Bellevue. This data gave us a starting place for outreach and development of materials and plans that were tailored specifically to a neighborhood or community, and what they needed. We were then able to initiate contact with individuals within communities and help them understand their vulnerability to hazards and provide guidance in line with community needs to build both personal and community resiliency.
- The development of networks with Community leaders was the next step. Seeking out Community Leaders who worked with BIPOC populations and other vulnerable groups to help with both messaging and understanding what communities needed with regard to preparedness. We engaged leaders from the Eastside Immigrant and Refugee Coalition, the Language Academy at the Westminster Chapel (audience here was mostly 1st generation immigrants), the YMCA, and Tzu Chi Disaster Relief organization. (All organizations who focused on BIPOC communities.) These leaders served as culture brokers, the links to groups with different cultural backgrounds or different lived experiences. We then developed a network of community leaders who became our partners for outreach and education specifically targeted to BIPOC and other vulnerable communities.
- The third step was to work with the Bellevue School District to embed emergency management concepts and principles into curriculum. Children are great teachers of their family members. This is extremely helpful for BIPOC communities who may have had difficult on unpleasant experiences with government representatives and so distrust them. (Many attribute the widespread acceptance of the campaigns focused on the dangers of smoking and the importance of recycling to teaching those concepts to children who then influenced their families!) My team and I worked with the high school teachers to sponsor a Community Emergency Response Team Training (CERT)

program. This was a way to teach students who were then excited about preparedness and went home to teach their families disaster preparedness skills. We worked with a special education teacher to develop videos with students and first responders on preparedness topics. The script paired special education students and students from BIPOC communities with first responders to talk about preparedness topics in short videos. Videos would then be uploaded to YouTube, the school district website, and the city's website. (We did not finish the videos as we were interrupted by the COVID stay at home order.)

My team and I designed, developed, and conducted a Community Emergency Response Team (CERT) Lite* training for Muslim women with all women instructors and staff and adhering to restrictions respectful of the Muslim faith.

(*CERT Lite is a shortened version of the longer 8-week CERT program, designed to make learning disaster preparedness skills more accessible to those who could not commit to an 8-week program.)

We also:

- Designed a CERT Lite program for Tzu Chi Disaster Relief organization and taught it in English and Mandarin.
- Worked with the WA State Community and Technical colleges to recruit students from BIPOC communities to enroll in emergency management courses and learn about emergency management as a profession.
- Provided disaster preparedness and hazard awareness courses to immigrants who had recently relocated to Bellevue.

I was a member of the Employees of Bellevue for Racial and Cultural Equity (EmBRACE) employee resource group to learn about and broaden my understanding of racial and social justice issues.

I presented to an employee resource group on the disproportional impacts of disasters on BIPOC communities due to years of systemic racism.

While not geared specifically to racial equity, I am proud of the work I did in areas that provided accessibility to people of all races who are differently abled:

- My team and I, working with the City of Redmond, co-hosted the full CERT program for differently abled participants, providing ASL translators, tactile translation team support, and using universal design principles, allowing all who were interested, able to take the course and become certified CERT members with disaster response skills.
- Working with the City ADA administrator, we used grant funds to purchase and install wheelchair charging stations in all five Community Centers and at Bellevue City Hall. I also used OEM grant funds to purchase six more wheelchair charging stations and plans were made with private sector partners around the city to install the stations. These stations ensure people are not stranded during peacetime, and are most especially useful when disasters occur so that those in electric wheelchairs are able to evacuate safely.

- My team incorporated universal design principles into emergency management training materials so that those with vision challenges are able to see and use the materials.

17. How do you intend for OEM to work with Seattle's underrepresented communities, including those with low English proficiency?

Building resilience in any community starts with working to understand what is most important to a community —before asking them to do anything – and seeking to understand, prior to giving people a 'should' like "you should be prepared." Then we can link resilience to what the community feels is important. Resilience is directly related to the ability of a community to stay connected during challenging situations and working together to solve problems. For underrepresented communities, the use of culture brokers (those who are connected to a community and have a relationship with government) can serve as a bridge to make pre-disaster connections with underrepresented communities. Once connection is made, relationships may be forged. It is through those relationships that we understand what a community needs and feels is important and can connect resilience building to those things. OEM recruits and hires Community Safety Ambassadors who are community members who can teach basic disaster preparedness skills (ways to be safer during a disaster such as an earthquake or winter weather), provide 911 outreach and education, and teach hands-only CPR to immigrant, refugee and limited-English-speaking communities. The ideal candidate is a trusted community member, has knowledge of the community they will be training, speaks the same language, identifies and has a sense of service to the community, is comfortable speaking publicly and can demonstrate leadership ability.

Preparedness

18. How will you measure your progress in improving the City's disaster preparedness?

Preparedness can be measured in a variety of ways:

a. Continue to follow established practices for conducting after action reviews, identifying gaps in response, and following through with corrective action plans. Even the smallest incident provides us with an opportunity to improve.
b. Increase the frequency of exercises, particularly multi-departmental exercises. Again, **this lets us make measurable improvements in response based on observed gaps.**
c. Focus on community skills training: Stop the Bleed, search and rescue, utility control, fire extinguisher use. These skills will save lives during a major emergency.
    i. # of people reached
    ii. Pre and post training knowledge
    iii. The more people that have these skills and the confidence to use them, the better off we all are
d. Public access to emergency information
    i. Number of people signed up for Alert Seattle

ii. Availability of Earthquake Early Warning and communities understanding of that system (may be live as early May 2021)
iii. Ability to reach people that speak a language other than English with emergency messaging (currently working on pre-translated hazard messaging and partnerships with CBOs to get emergency info out through existing community networks

e. An increased diversity of stakeholders/partners that are directly involved in OEM planning efforts
f. Increasing reach with preparedness messaging to those communities that are likely to be the most impacted (Limited English, low income, seniors, etc.)

19. How did you work with all facets of the community in Bellevue to improve preparedness? What will you do differently in Seattle?

Improving preparedness in any jurisdiction is much the same, the scale of that work is different, depending on the size and complexity of the jurisdiction. The methods I used in Bellevue are applicable to Seattle, the scale is different. I began with developing relationships with Community leaders, faith-based organizations, non-profits and the private sector. Each of these groups provides critical ties to people that make up the community and are often the conduit to reaching underserved populations. Those relationships reveal the strengths and priorities of those groups and also insight into where the gaps in preparedness exist – which is usually tied to lack of knowledge of threats and hazards a community face. Once relationships are established, working with each of these groups to understand their needs and perspectives about how they may engage in the work of preparedness. Using volunteers as a force multiplier for teaching disaster skills, conducting community exercises, and looking for opportunities to engage in and support community preparedness are all components for increasing preparedness. Seeking community input on the plans and strategies that affect them helps the community understand what they are facing, how the government will respond, and how preparedness builds resilience.

20. Has the COVID-19 pandemic left the community less resilient and/or less prepared for a major disaster, such as an earthquake? If so, what will be your near-term steps to bring the city back to pre-COVID preparedness and strengthened resiliency?

The pandemic has impacted every aspect of our society, including disaster resilience. More residents of the city are struggling to feed their families on a day-to-day basis, so we know that more individuals will be in need of assistance after a disaster. All of the issues that the community has been struggling with because of the pandemic will also be issues following an earthquake. The parts of the community most impacted by COVID are now less resilient to withstand any additional impacts.

OEM has worked with our partner departments to identify ways to adapt a variety of disaster plans—including winter storm and earthquake—to pandemic considerations. The good news is that the essential personnel that we rely on during a disaster have already been working under

increased pandemic safety protocols for months—they know how to do their jobs while wearing PPE, and FAS has done a great job of ensuring there is plenty on hand. The functions that would be most challenging to implement during the pandemic are those related to the provision of food, water and sheltering to residents. We know the need for these services will be greater, and are working to improve our ability to deliver these services in a physically distanced environment. OEM is coordinating with HSD, OED, SPR, FAS, and Visit Seattle to develop a framework for how we could shelter residents in hotel rooms during a major earthquake—taking advantage of a temporary FEMA rule change to enable greater physical distancing in mass sheltering and feeding settings. This is not to say that there would not be challenges and some non-life safety functions [such as debris removal—for example] might go a little more slowly under pandemic precautions, but we have been working closely to minimize the pandemic's impact to the time sensitive functions to save lives and alleviate suffering after a major disaster.

The other near-term step is to continue to address the immediate needs of people suffering due to the pandemic. Restarting an inclusive economy, one that doesn't leave behind the most vulnerable, will help rebuild resilience in our residents. The more people who have stable housing and stocked pantries before a disaster, the fewer people the City will need to provide for afterwards. In order to restart that economy, we need to focus on getting through the pandemic safely. Which means ensuring vaccinations to frontline staff and vulnerable residents, while continuing the economic lifelines to small businesses so they can weather the impacts a little longer. Responding to the needs of the community caused by the pandemic will increase their resiliency.

21. Unreinforced Masonry (URM) buildings pose a significant risk in the City and region. Are you aware of the City's previous URM studies? What immediate steps can the City take to address this issue, and how, in the long-term, can the City address the issue of retrofitting these buildings to ensure the safety of occupants?

The City has studied and attempted to deal with the issue of URMs for approximately 50 years.

- Because there is a high cost for retrofitting these buildings, we have never identified a solution that would effectively incentivize private building owners to seismically retrofit their buildings voluntarily.
- Attempts to implement voluntary retrofit programs in California have proven ineffective.
    - **NDC Report page 20**- *In 2006, the Seismic Safety Commission of California surveyed 260 URM loss reduction programs throughout Seismic Zone 4.4 Of these programs,* ***39 allowed voluntary retrofits and their average rate of retrofit was 16%.*** *When you compare that to the* ***70% average rate of retrofit across the 134 mandatory retrofit programs****, it is clear that voluntary retrofit programs have historically been ineffective*
    - A mandatory retrofit ordinance is likely the only path to making the more than 1100 unreinforced masonry buildings in the city safer.
    - Some of the reluctance to move forward on a mandatory ordinance in the past has been based on the belief that an ordinance could have disproportionate impacts on some groups. For example, a building owner

may pass on costs of a retrofit in the form of higher rents, having a negative impact on affordable housing.
- A thoughtfully developed policy that takes into account potential disproportioned impacts, can mitigate those impacts.
- Ignoring the issue (and not requiring retrofit) will surely result in disproportionate impacts from an earthquake:
  - URMs disproportionately located in areas with higher numbers of people of color, low income, and limited English
  - Groups already disproportionately impacted by an earthquake would suffer even greater impacts due to increased risk of displacement, death/injury, utility outages, and emergency access to their neighborhoods due to URM damage.
  - **2,303** affordable housing units within URM buildings
- We need to stop viewing seismic safety, affordable housing, historic preservation, and clean energy as competing policy priorities. They have shared goals and can likely result in cost savings/efficiency if coordinated appropriately.
- A successful mandatory retrofit ordinance will require a menu of financing mechanisms that can help absorb some of the financial burden placed on building owners.
- There has already been significant work done identifying what funding and financial mechanisms could be support a mandatory retrofit ordinance and decrease cost burden of building owners:
  - 2019 National Development Council report for the City of Seattle on funding solutions (historic tax credits, retuning of transfer of development rights program, Commercial Property Assessed Clean Energy and Resilience (C-PACER) funding)
  - ASAP! (Alliance for Safety, Affordability and Preservation) recommended retrofit credit program, where building owners could sell development rights or "density credits" to fund retrofits.
- In the short-term, OEM will continue to seek FEMA mitigation funding to address vulnerable buildings where possible. However, these opportunities are very limited.
  - **Example:** OEM and Community Roots Housing partnered on an application to fund a seismic retrofit of the **Bremmer Apartments, a 49-unit affordable housing complex in downtown Seattle**. In May 2020, Community Roots Housing was awarded $5 million.

22. In previous jobs, how did you know that city staff understood their roles and were prepared to respond in the event of a disaster?

We developed a comprehensive training and exercise plan that included regular engagement of city staff in training, drills, and exercises to practice disaster response roles and responsibilities.

23. What were the most innovative training and exercise improvements you witnessed during your tenure at California Governor's Office of Emergency Services? What will you bring as lessons learned from that role as you come to Seattle?

The development of a training and exercise program for non-public-safety organizations to demonstrate how they worked with and integrated into California's emergency management system. The best example of this is a training and exercise program for California Veterinarians and the subsequent development of the CA Veterinary Medical Reserve Corps (CVMRC), which trained Vets and Vet techs who deployed to disasters as responders for animal rescue and as part of the Incident Command System. The CVMRC spurred the development of a statewide network of volunteer animal rescue groups who supported large wildfire incidents.

Lessons learned from this are that everyone has a role in emergency management and once the principles are understood in terms that a group can connect to their organizational mission and goals, they can easily integrate into emergency management.

External Relations

24. How do Seattle's emergency management needs differ from those across the Puget Sound counties and the state?

Seattle hazards, while similar to other Puget Sound jurisdictions, will be more impactful due to the size and complexity of the population. Seattle also has many unreinforced masonry buildings which are especially dangerous in an earthquake zone. Seattle is the hub of the Pacific Northwest. With 730,400 residents (2018) and 581,780 jobs (2017), Seattle is the largest municipality in the region. It is the center of cultural, governmental and economic activity. Paradoxically, Seattle is both a city of neighborhoods that looks inward and one of the most trade dependent cities in the U.S. Forty percent of Washington State jobs are dependent on international trade, with the Port of Seattle serving as the main international trade hub.

Seattle is famous for rainy weather, proximity to nature, coffee, software, and airplanes, but as is often the case with things a place is famous for, the truth is more complex and interesting. Hazards do not affect the population equally. Some people suffer more than others. These people are 'socially vulnerable.' If large numbers of socially vulnerable people are impacted by a hazard, this inequity will make the resulting disaster "bigger." Seattle's most vulnerable people tend to be clustered around Seattle's edges, in Rainier Valley, Beacon Hill, south downtown, and North Seattle (around Northgate and Lake City Way). Social vulnerability affects all hazards. One of the most effective ways to reduce a community's overall vulnerability is to target social vulnerability.

25. What are your goals and plans for maintaining and improving an effective partnership with King County and neighboring jurisdictions?

While the Emergency Manager in Bellevue, I fostered good relationships with neighboring jurisdictions, and Snohomish, King, and Pierce County emergency managers. That work is maintained by regular engagement in a number of regional initiatives, the development of grant funded projects, and committee work. The Puget Sound Region emergency managers are very collaborative and work together on a regular basis. I will continue this collaboration.

26. What do you see as Seattle's challenges and opportunities in working with the State Emergency Management Division and FEMA?

OEM has had good working relationships with State EMD and FEMA. As we see the administration changes at the national level, we are also excited to see that a fellow, known emergency management colleague, Deanne Criswell, will be President Biden's FEMA Administrator appointment. Ms. Criswell is a fellow Big City Emergency Manager and she is intimately familiar with the successes and challenges of all large, metropolitan city emergency management programs. We also see more opportunities for mitigation efforts through FEMA and a possibility for funding to help decrease the impacts of disaster on our community. Short term with the transition, there will be staff changes and likely process and policy changes.

OEM works most frequently with State EMD. EMD has gone through many changes over the last few years and continuity has been impacted. We work with their team significantly on FEMA COVID public assistance processes. With COVID's large impacts, this work has been complex. OEM does participate on several committees at the State EMD levels and continues to be an avenue for us to influence and strengthen emergency management regionally and across the state.

27. How can Seattle maximize its share of state and federal resources in the current pandemic and future disasters?

There are a variety of sources of funding to help our City and community recover from the COVID-19 pandemic. Working closely with the Office of Intergovernmental Relations, the City Budget Office and Citywide accounting, OEM has been central to instituting the strategy to optimize ever single state, federal and private source of funding that has become available.

OEM is the administrator of reimbursement and funding for FEMA Public Assistance. Because FEMA limits the types of costs that can be reimbursed, it has been and will continue to be imperative to maximize this source of reimbursement and apply additional funding sources to non-reimbursable categories such as rental assistance, food assistance and reopening expenses for city direct or contracted services. As funding continues to flow to the City, the feedback loop between internal departments and our federal and state partners will help ensure that policy priorities are advanced at the State and Federal efforts. With regard to FEMA Public Assistance, Seattle can maximize its share of state and federal resources by working with State EMD and FEMA to understand the requirements for obtaining funding and for receiving reimbursement for disaster and incident related activities.

28. Are you active in the Emergency Management Accreditation Program (EMAP)? If so, what priorities will you emphasize in your work with national partners?

In 2016 the city's emergency management program was EMAP accredited and we are currently preparing for re-accreditation with our scheduled assessment occurring in September. Though not previously active in EMAP, I am an advocate of this program whereby the Emergency Management Standard is designed as a tool for continuous improvement as part of the voluntary accreditation process for local, state, federal, higher education and tribal emergency management programs. EMAP looks at all the core elements of a comprehensive program, which recognizes the ability of emergency management programs to bring together personnel, resources and communications from a variety of agencies and organizations in preparation for

and in response to an emergency, in addition to obtaining the ability to measure those capabilities. The accreditation process evaluates emergency management programs on compliance with requirements in sixteen areas, including: planning; resource management; training; exercises, evaluations, and corrective actions; communications and warning; and administration.

As for priorities in this area and my work with national partners, I believe in the vitalness of ongoing planning that addresses catastrophic events and building strong resource management capabilities at all levels.

29. What do you see as the private sector's role in emergency preparedness, response, and recovery? How will you support those roles as OEM's director?

The private sector owns and operates 70 to 80% of the nation's critical infrastructure. Partnering with the private sector is crucial to being successful in protecting that infrastructure. The private sector has a direct role in economic recovery and can be instrumental in helping a jurisdiction support redevelopment and recovery. Many private sector companies are able to devote more resources to research and development than can the public sector, and that research often leads to innovation that is advantageous to emergency management.

The private sector also contributes to disaster-recovery financing in a variety of ways, including playing a key role in early response and long-term recovery, collaborating with the public sector in public–private partnerships, driving innovation and facilitating technology use, helping smaller communities manage influxes of funds, and supplementing the federal disbursement processes.

Management and Operations

30. How do you approach organizational management? How would you describe your leadership style?

My leadership style is collaborative. I believe that teams work best and are most productive when they support each other and when each member understands how their work is instrumental to accomplishing the Office's mission. It is important that my team knows that I appreciate and support their work and respect their expertise. I believe investing in staff development and supporting each individual's career goals supports the team's effectiveness.

31. How will you review internal operations at OEM to determine if they need improvement?

Following each incident or exercise, OEM uses the After-Action Review process to evaluate the effectiveness of that work. That process includes the development of an improvement plan which identifies areas of improvement, who is responsible for each area, and a timeframe for completion of the improvement actions. We also develop a three-year strategic plan with input from stakeholders to provide a framework for our work delineate the goals and objectives need to accomplish them. The strategic plan is integrated with and connected to all of the plans that specify department roles and responsibilities for all phases of emergency management.

32. What do you see as your role in providing a welcoming and safe workplace for all City employees?

Through the practice of servant leadership; supporting my team and all who work with OEM. This support means spending time, coaching, mentoring, and supporting all I engage with and looking for ways to advise or coach others in emergency management principles and techniques.

33. How will you bridge operational silos across departments and maintain effective relationships with and between separate operations centers?

Effective emergency management is dependent upon building and maintaining relationships across disciplines and departments. OEM works with all operational departments on projects, through committee and task force work and by engaging in training and exercises. The Emergency Operations Center includes department representatives from the city's operational departments which OEM regularly engages with to practice disaster roles in drills and exercises.

Response to the pandemic has required City departments to work together in new and different ways. Department directors have experienced the power of cross-departmental work and are committed to working to maintain that cross departmental work.

My role is to continuously demonstrate the ways in which departments can continue to work together on city wide initiatives, such as Recovery from the pandemic, which includes community resilience building.

34. How will you engage and prepare department leadership for disaster preparedness, response, and recovery?

The Mayor's Emergency Executive Board (EEB) consisting of Mayor's Office senior staff and the directors of city departments meet quarterly to discuss each department's role and responsibilities in emergency mitigation, preparedness, prevention, response and recovery as defined in the Comprehensive Emergency Management Plan. It is through the work of this committee that OEM engages department leadership for all phases of emergency management. The work of this Board includes practice of skills needed for successful and efficient emergency management with exercises.

File #: CB 119982, **Version:** 1

CITY OF SEATTLE

ORDINANCE _____

COUNCIL BILL _____

AN ORDINANCE relating to the Seattle Commission for People with Disabilities; changing the name to the Seattle Disability Commission; and requesting that the Code Reviser revise the Seattle Municipal Code accordingly.

WHEREAS, disability communities are culturally diverse and have a long tradition of political activism, including a rich discourse around self-identification; and

WHEREAS, some, but not all, members of disability communities use person-first language ("people with disabilities") to emphasize personhood over disability status; and

WHEREAS, disability communities, including some members of the Deaf and Autistic communities, as well as those who proudly embrace disability as a political and/or cultural identity, have long expressed that person-first language does not represent them, preferring identity-first language ("disabled person"); and

WHEREAS, "disability" is an umbrella term that is inclusive of the myriad disability communities who prefer person-first and identity-first language; and

WHEREAS, the diverse body of the Seattle Commission for People with Disabilities voted unanimously on June 18, 2020 to change its name to "The Seattle Disability Commission"; and

WHEREAS, the City of Seattle seeks to be an open and inclusive city for all its residents;

NOW, THEREFORE,

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. The Seattle Commission for People with Disabilities is renamed "The Seattle Disability

Commission."

Section 2. The City Council requests that the Code Reviser, pursuant to the authority established by Seattle Municipal Code Section 1.03.030, revise the Seattle Municipal Code to replace references to "The Seattle Commission for People with Disabilities" with "The Seattle Disability Commission."

Section 3. This ordinance shall take effect and be in force 30 days after its approval by the Mayor, but if not approved and returned by the Mayor within ten days after presentation, it shall take effect as provided by Seattle Municipal Code Section 1.04.020.

Passed by the City Council the _____ day of _____, 2020, and signed by me in open session in authentication of its passage this _____ day of _____, 2020.

_____

President _____ of the City Council

Approved by me this _____ day of _____, 2020.

_____

Jenny A. Durkan, Mayor

Filed by me this _____ day of _____, 2020.

_____

Monica Martinez Simmons, City Clerk

(Seal)

SUMMARY and FISCAL NOTE

Department:	Dept. Contact/Phone:	Executive Contact/Phone:
Office for Civil Rights	Caedmon Cahill: 206.684.7114	Lisa Gaccione: 206-684-5339

1. BILL SUMMARY

a. **Legislation Title:** AN ORDINANCE relating to the Seattle Commission for People with Disabilities; changing the name to the Seattle Disability Commission; and requesting that the Code Reviser revise the Seattle Municipal Code accordingly.

b. **Summary and background of the Legislation:** This legislation strikes each reference to the Seattle Commission for People with Disabilities from the Seattle Municipal Code and replaces it with Seattle Disability Commission.

On June 18, 2020, the Seattle Commission for People with Disabilities unanimously voted in favor of changing the Commission's name to the Seattle Disability Commission.

2. CAPITAL IMPROVEMENT PROGRAM

a. **Does this legislation create, fund, or amend a CIP Project?** ___ **Yes** _X_ **No**

3. SUMMARY OF FINANCIAL IMPLICATIONS

a. **Does this legislation amend the Adopted Budget?** ___ **Yes** _X_ **No**

b. **Does the legislation have other financial impacts to the City of Seattle that are not reflected in the above, including direct or indirect, short-term or long-term costs?**
No.

c. **Is there financial cost or other impacts of *not* implementing the legislation?**
No.

4. OTHER IMPLICATIONS

a. **Does this legislation affect any departments besides the originating department?**
No.

b. **Is a public hearing required for this legislation?**
No.

c. **Does this legislation require landlords or sellers of real property to provide information regarding the property to a buyer or tenant?**
No.

d. Is publication of notice with *The Daily Journal of Commerce* and/or *The Seattle Times* required for this legislation?
No.

e. Does this legislation affect a piece of property?
No.

f. Please describe any perceived implication for the principles of the Race and Social Justice Initiative. Does this legislation impact vulnerable or historically disadvantaged communities?

Within disability communities there is a diversity of cultures, histories, and political movements. The language used for self-identification is one area in which these distinctions are readily apparent across disability communities. Many members of these communities prefer person first language while many others prefer identity first language. Changing the Commission's name to Seattle Disability Commission will create a more inclusive environment to all members of Seattle's disability communities regardless of individual language preferences.

The Commission's current name—Seattle Commission for People with Disabilities—is a person first construction. Person first language aims to center personhood over an individual's disability status. Advocates of person first language argue that its use is more humanizing and puts the focus on the whole person rather than a single characteristic.

Alternatively, identity first language puts one's disability front and center. If the Commission were to adopt identity first language, it might be called the Seattle Disabled People's Commission. For some disability communities the use of identity first language is culturally significant. For example, Deaf and Autistic communities, have long expressed a strong preference for identity first language. Additionally, many individuals from various disability communities use identity first language to reclaim disability as a political identity, similar to LGBTQ communities' reclamation of queer.

With the goal of creating greater inclusivity, Commission members deliberated and unanimously agreed that the Commission's name should be changed to Seattle Disability Commission. This is not the first time a commission has changed its name for this purpose. Most recently, the Lesbian, Gay, Bisexual, Transgender, Queer (LGBTQ) Commission added queer to its name.

g. If this legislation includes a new initiative or a major programmatic expansion: What are the specific long-term and measurable goal(s) of the program? How will this legislation help achieve the program's desired goal(s).
This legislation does not include a new initiative or major programmatic expansion.

Other Issues:

- None

List attachments/exhibits below:

Legislation Text

File #: Appt 01618, **Version:** 1

Appointment of Rebecca Bryant as member, Seattle Women's Commission, for a term to July 1, 2022.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Rebecca Bryant*		
Board/Commission Name: *Seattle Women's Commission*		**Position Title:** *Member*
☒ **Appointment** ***OR*** ☐ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ Council ☒ Mayor ☐ Other: *Fill in appointing authority*	**Date Appointed:** 12/10/2019	**Term of Position: *** ~~7/2/2018~~ 7/2/2020 **to** to ~~7/1/2020~~ 7/1/2022 ☒ *Serving remaining term of a vacant position*
Residential Neighborhood: *Ballard*	**Zip Code:** *98117*	**Contact Phone No.:**

FILED
CITY OF SEATTLE
20 JAN -7 PM 3: 33
CITY CLERK

Background:

Rebecca is passionate about public policy and recognizes the power our community has to improve lives. She is fortunate to see this work in action in her role as Community Relations Manager for the Fred Hutchinson Cancer Research Center in Seattle. After graduating with a dual degree in Politics & Government and Business & Leadership from the University of Puget Sound in Tacoma, Rebecca was honored to accept a position with Representative Adam Smith of Washington State's 9th Congressional District in his Washington, DC office. She served as Congressman Smith's Executive Assistant, then as the Political Director for his 2014 re-election campaign, and finally as Communications Director for his office leading into his successful election as Chairman of the House Armed Services Committee. After 9 years with Congressman Smith, Rebecca returned home from Washington, DC to live in the Pacific Northwest in June 2019.

Authorizing Signature (original signature): Jenny A. Durkan	**Appointing Signatory:** *Jenny A. Durkan* *Mayor of Seattle*

Rebecca Bryant

[redacted]

Professional Experience

Fred Hutchinson Cancer Research Center | Seattle, WA
Community Relations Manager **June 2019 - Present**

- Supports the Vice President of Government and Community Relations by serving as a liaison to community groups, civic organizations, and local elected officials to promote the Fred Hutch mission of eliminating cancer and related diseases as causes of human suffering and death.

U.S. House of Representatives, Office of Congressman Adam Smith | Washington, D.C.
Communications Director **October 2015 - May 2019**

- Managed all press inquiries and served as the Congressman's on-the-record spokesperson.
- Wrote press releases, talking points, media advisories, email newsletters, and social media.
- Coordinated with outside vendors to execute communications goals.
- Developed and maintained critical relationships with local media, business associations, grassroots advocacy organizations, and not-for profit organizations.
- Designed and translated website into multiple languages to reflect the diversity of the 9th Congressional District and enhance accessibility for constituents.

Director of Strategic Initiatives **January - September 2015**

- Developed and managed micro-targeted communications and special projects with both the Washington, D.C. policy team and Renton, WA District Office outreach staff.

Adam Smith for Congress | Seattle, WA
Political Director **January 2013 – December 2014**

- Successfully managed Congressman Adam Smith's 2014 re-election campaign.
- Designed and implemented strategic stakeholder outreach plan.
- Organized in-state fundraising and served as community liaison to constituents, local elected officials, civic leaders, and Democratic Party organizations.
- Designed and managed field plan and coordinated efforts with local campaigns.

U.S. House of Representatives, Office of Congressman Adam Smith | Washington, D.C.
Executive Assistant/ Legislative Correspondent **December 2010 – December 2012**

- Managed daily schedule in Washington, D.C., coordinated domestic and international travel schedule, and led special events for Ranking Member of the House Armed Services Committee.

Education

University of Puget Sound | Tacoma, WA May 2010
Bachelor of Arts | Majors: Politics & Government, Business & Leadership | Emphasis: US Politics

Summary of Qualifications

- Communication and public relations expertise
- Demonstrated record of developing networks and working with diverse coalitions
- Ability to work well in a team environment, goal and detail oriented

Organizations

- Connect to Congress, Washington State Society, NARAL Pro-Choice WA

Seattle Women's Commission
September 2020

21 Members: Pursuant to *SMC 3.14.920, all* members subject to City Council confirmation, *2*-year terms:

- *8* City Council-appointed
- *9* Mayor-appointed -plus one Get Engaged
- *4* Other Appointing Authority-appointed: Commission-appointed

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
2			1.	Member	Marcia Wright-Soika	7/02/19	7/01/21	1	Mayor
4			2.	Member	Abriel Johnny	7/02/20	7/01/22	1	Mayor
2	F	2	3.	Member	Rhonda Carter	7/02/19	7/01/21	2	Mayor
1			4.	Member	Sangyoon Sophia Lee	7/02/20	7/01/22	1	Mayor
6			5.	Member	Harmony Eichsteadt	7/02/19	7/01/21	1	Mayor
6			6.	Member	Jennifer Gordon	7/02/19	7/01/21	2	Mayor
6			7.	Member	Rebecca Bryant	7/02/20	7/01/22	1	Mayor
1	F	7	8.	Member	Diya Khanna	7/02/18	7/01/20	1	Commission
6	F	4	9.	Member	Zoe True	7/02/19	7/01/21	2	Mayor
9	F	7	10.	Member	Idabelle Fosse	7/02/18	7/01/20	3	City Council
1	F	3	11.	Member	K. Min Pease	7/02/19	7/01/21	2	City Council
2	F	N/A	12.	Member	Jamilah Williams	7/02/19	7/01/21	2	City Council
2	F		13.	Member	Vacant	7/02/18	7/01/20	2	City Council
2	F	1	14.	Member	Tana Yasu	7/02/18	7/01/20	2	City Council
8	F	5	15.	Member	Darya Farivar	7/02/19	7/01/21	2	City Council
			16.	Member	Vacant	7/02/19	7/01/21		City Council
			17.	Member	Vacant	7/02/20	7/01/22		Commission
			18.	Member	Vacant	7/02/20	7/01/22		City Council
1	F	-	19.	Member	Whitney Nakamura	7/02/18	7/01/20	1	Commission
3			20.	Member	Yadira Siqueiros	7/02/19	7/01/21	1	Commission
1	F	3	21.	Get Engaged	Adriana Lasso-Harrier	9/01/19	8/31/20	1	Mayor

SELF-IDENTIFIED DIVERSITY CHART

	Men	Women	Transgender	Unknown	(1) Asian	(2) Black/ African American	(3) Hispanic/ Latino	(4) American Indian/ Alaska Native	(5) Other	(6) Caucasian/ Non-Hispanic	(7) Pacific Islander	(8) Middle Eastern	(9) Multiracial
Mayor	0	9			0	0	0	0	0	0	0	0	0
Council	0	5			0	0	0	0	0	0	0	0	0
Comm	0	3			0	0	0	0	0	0	0	0	0

Total	0	13			5	4	0	0	0	1	0	0	1

Key:

***D** List the corresponding *Diversity Chart* number (1 through 9)
****G** List *gender*, **M** = Male, **F**= Female, **T**= Transgender, **U**= Unknown
RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01627, **Version:** 1

Appointment of Abriel Johnny as member, Seattle Women's Commission, for a term to July 1, 2022.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Abriel Johnny*		
Board/Commission Name: *Seattle Women's Commission*		**Position Title:** *Member*
☒ **Appointment** ***OR*** ☐ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ Council ☒ Mayor ☐ Other: *Fill in appointing authority*	**Date Appointed:** 12/10/2019	**Term of Position: *** ~~7/2/2018~~ 7/2/2020 **to** to ~~7/1/2020~~ 7/1/2022 ☒ *Serving remaining term of a vacant position*
Residential Neighborhood: *West Seattle*	**Zip Code:** 98146	**Contact Phone No.:**

Abriel Johnny is from the Cowichan/Tlinigt tribes and serves on the Board of Directors for United Indians of All Tribes Foundation and holds a B.A. in Law and Policy, University of Washington and a M.P.S., in Political Management, George Washington University. She is a clothing and jewelry designer which assisted her in paying for her education. She has been attending Seattle Women's Commission meetings and very interested in being a commissioner and contribute her skills, knowledge, and education to the work of the Commission in Seattle. Her passion is to build a sustainable, gender safe, and racially equitable future for our future generations.

Authorizing Signature (original signature): Jenny A. Durkan	**Appointing Signatory:** *Jenny A. Durkan* *Mayor of Seattle*

ABRIEL JOHNNY

Creative professional passionate about racial and social equity. Knowledgeable about government relations, legislative process**,** and political research

SKILLS & KNOWLEDGE

Cultural Intelligence	Community Outreach	Strategic Planning
Emotional Intelligence	Government Relations	Policy Development

EDUCATION

M.P.S., Political Management, George Washington University 2018
Nonprofit Management Certificate, University of Washington 2016
B.A., Law and Policy, University of Washington 2015

EXPERIENCE

Cowlitz Indian Tribe, *Government Relations & Affairs,* 2016- Present
Member of Strategic Planning Committee, Communications Committee, and Tribal Council Executive Committee staffer. Strengthen local and state government-to-government relationships. Track Washington State legislation of interest to Cowlitz Tribe. Cowlitz Tribe representative for developing the new Department of Children, Youth, and Families tribal consultation policy.

Washington Indian Gaming Association, temporarily covered *Deputy Director duties* 2016
Served as WIGA representative on communication & media projects with Washington State Tribes. Supported planning process for WIGA Northwest Indian Gaming Conference & Expo.

United Indians of All Tribes Foundation, *Executive Assistant,* 2016
Revised board governance documents and contribute to fundraising efforts. Aide in Cultural event planning; contributed to media and public relations strategies, serve as government relations liaison for cultural event.

Washington State Senate, *Session aide, Senator McCoy office***,** (Legislative session) 2015-2016
Created, organized, and implemented *Native Legislative Shadow Day* for students. Managed outreach and community engagement to students of color. Managed early education research, casework, and constituent communications.

United Indians of All Tribes Foundation, *Early Childhood Specialist***,** 2008-2011
Provided early childhood education and access to comprehensive services to Native families. Managed outreach, recruitment, and community engagement for entire program

COMMUNITY LEADERSHIP

United Indians of All Tribes Foundation, *Board of Directors, Secretary Officer* 2017-present
Seafair Pow Wow Committee, *Chair of Royalty, Media, PR & Government Relations* 2016-present
Native Action Network, *Presenter at Young Women's Leadership Academy* 2017

TRAINING

Leading others, Department of Enterprise Services 2017
Native American Leadership Training, Native Nation Events 2016

Seattle Women's Commission
September 2020

21 Members: Pursuant to *SMC 3.14.920, all* members subject to City Council confirmation, *2*-year terms:

- *8* City Council-appointed
- *9* Mayor-appointed -plus one Get Engaged
- *4* Other Appointing Authority-appointed: Commission-appointed

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
2			1.	Member	Marcia Wright-Soika	7/02/19	7/01/21	1	Mayor
4			2.	Member	Abriel Johnny	7/02/20	7/01/22	1	Mayor
2	F	2	3.	Member	Rhonda Carter	7/02/19	7/01/21	2	Mayor
1			4.	Member	Sangyoon Sophia Lee	7/02/20	7/01/22	1	Mayor
6			5.	Member	Harmony Eichsteadt	7/02/19	7/01/21	1	Mayor
6			6.	Member	Jennifer Gordon	7/02/19	7/01/21	2	Mayor
6			7.	Member	Rebecca Bryant	7/02/20	7/01/22	1	Mayor
1	F	7	8.	Member	Diya Khanna	7/02/18	7/01/20	1	Commission
6	F	4	9.	Member	Zoe True	7/02/19	7/01/21	2	Mayor
9	F	7	10.	Member	Idabelle Fosse	7/02/18	7/01/20	3	City Council
1	F	3	11.	Member	K. Min Pease	7/02/19	7/01/21	2	City Council
2	F	N/A	12.	Member	Jamilah Williams	7/02/19	7/01/21	2	City Council
2	F		13.	Member	Vacant	7/02/18	7/01/20	2	City Council
2	F	1	14.	Member	Tana Yasu	7/02/18	7/01/20	2	City Council
8	F	5	15.	Member	Darya Farivar	7/02/19	7/01/21	2	City Council
			16.	Member	Vacant	7/02/19	7/01/21		City Council
			17.	Member	Vacant	7/02/20	7/01/22		Commission
			18.	Member	Vacant	7/02/20	7/01/22		City Council
1	F	-	19.	Member	Whitney Nakamura	7/02/18	7/01/20	1	Commission
3			20.	Member	Yadira Siqueiros	7/02/19	7/01/21	1	Commission
1	F	3	21.	Get Engaged	Adriana Lasso-Harrier	9/01/19	8/31/20	1	Mayor

SELF-IDENTIFIED DIVERSITY CHART

	Men	Women	Transgender	Unknown	(1) Asian	(2) Black/ African American	(3) Hispanic/ Latino	(4) American Indian/ Alaska Native	(5) Other	(6) Caucasian/ Non-Hispanic	(7) Pacific Islander	(8) Middle Eastern	(9) Multiracial
Mayor	0	9			0	0	0	0	0	0	0	0	0
Council	0	5			0	0	0	0	0	0	0	0	0
Comm	0	3			0	0	0	0	0	0	0	0	0

Total	0	13			5	4	0	0	0	1	0	0	1

Key:

***D** List the corresponding *Diversity Chart* number (1 through 9)
****G** List *gender*, **M** = Male, **F**= Female, **T**= Transgender, **U**= Unknown
RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01767, **Version:** 1

Appointment of Steven Pray as member, Seattle LGBTQ Commission, for a term to October 31, 2021.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Steven Pray*		
Board/Commission Name: *Seattle LGBTQ Commission*		**Position Title:** *Commission Member*
☒ **Appointment** ***OR*** ☐ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ Council ☒ Mayor ☐ Other: *Fill in appointing authority*	**Date Appointed:**	**Term of Position: *** 11/1/2019 **to** 10/31/2021 ☒ *Serving remaining term of a vacant position*
Residential Neighborhood: *First Hill*	**Zip Code:** *98101*	**Contact Phone No.:**
Background: Steven Pray grew up in Kent, Washington, a suburb of Seattle. After graduating high school, he attended Central Washington University and received a degree in political science. He moved to Seattle in 2015 to start law school at Seattle University and has been living in the city ever since. After he graduated from law school he began working as a Union Representative at PROTEC17 with his assignment primarily being the City of Seattle.		
Authorizing Signature (original signature): Jenny A. Durkan	**Appointing Signatory:** *Jenny A. Durkan* *Mayor of Seattle*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

STEVEN PRAY

EDUCATION

Seattle University School of Law Seattle, WA
Juris Doctor, cum laude May 2018

Awards/Honors: Admission Fellow; Trustee Law Scholarship; CALI award, Personal Injury Litigation; Dean's List, 2016-2017; WSBA Labor & Employment Law Grant

Advocacy: Labor and Employment Law Association, *Vice President*
Seattle Journal for Social Justice, *Marketing, Business & Events Editor*
Workers' Rights Clinic, *Rule 9 Licensed Legal Intern*

GPA/Class Rank: 3.55 / Top 20%

Central Washington University Ellensburg, WA
Bachelor of Arts, Political Science; Minor, Law and Justice, cum laude June 2014

Awards/Honors: Political Science Department, *Valedictorian*
National Social Science Ass'n Undergraduate Student Competition, *2014 Winner*
Afternoon Ceremony Student Commencement Speaker

EXPERIENCE

Professional & Technical Employees, Local 17 Seattle, WA
Union Representative August 2018-Present

- Bargaining the City of Seattle and Seattle Municipal Court collective bargaining agreements
- File and attend hearings for grievances and unfair labor practices
- Train shop stewards to engage current membership and register new employees as union members
- Lead labor management meetings at Seattle City Light, Department of Neighborhoods, and Seattle Public Utilit.
- Successfully organized the Records Management Specialists into our King County bargaining unit

Seattle Public Schools General Counsel's Office Seattle, WA
Legal Extern June 2016- August 2016

- Drafted and revised school board policies and procedures
- Created a manual containing legal guidelines for the contracts department including when bids must be competitive
- Researched and drafted memos on topics including employee termination, mandatory trainings, and affirmative action
- Represented the District before an administrative law judge during preliminary hearings for non-resident appeals

Kent School District Kent, WA
Substitute Teacher October 2014-June 2015

- Led classroom instruction for grades Kindergarten to 12th in subject areas including English, Math, and History
- Developed strategies to deliver teacher's desired curriculum
- Administered state required standardized tests and ensured consistency of process
- Responded and adapted to new environments daily by teaching in over 20 schools in the district

ADDITIONAL INFORMATION

Licenses: Washington State Bar Association, Active Member #54374

Publications: Pray, Steven. "Corporate Style Education Reform and the Latino Community." *Nat'l Social Science Assn. Journal*, Vol. 43, No. 2, 112-118. (2015).

Seattle Lesbian, Gay, Bisexual, Transgender and Queer Commission

September 2020

Members: Pursuant to *SMC 3.14.920, all* members subject to City Council confirmation, *2*-year terms:

- *8* City Council-appointed
- *9* Mayor-appointed
- *4* Other Appointing Authority-appointed: Commission-appointed

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
			1.	Member	Juan C. Rodriguez	5/1/19	4/30/21	1	City Council
			2.	Member	VACANT	5/1/19	4/30/21	1	Mayor
			3.	Member	Byram Simpson	5/1/19	4/30/21	2	City Council
			4.	Member	Latosha Correll	5/1/19	4/30/21	2	Mayor
			5.	Member	DeAunte Damper	5/1/19	4/30/21	1	City Council
			6.	Member	Manuel Venegas	11/1/19	10/31/21	3	Mayor
			7.	Member	Kari Lerum	11/1/19	10/31/21	2	Commission
			8.	Member	Steven Pray	11/1/19	10/31/21	1	Mayor
			9.	Member	VACANT	5/1/20	4/30/22	1	City Council
			10.	Member	Nathaniel Higby	5/1/20	4/30/22	1	Mayor
			11.	Member	Joseph Suttner	5/1/20	4/30/22	1	City Council
			12.	Member	Brett Pepowski	5/1/20	4/30/22	1	Mayor
			13.	Member	Michael B. Garrett	11/1/18	10/31/20	1	City Council
			14.	Member	Ryan Bush	11/1/20	10/31/22	1	Mayor
			15.	Member	Deepa Sivarajan	11/1/19	10/31/21	2	City Council
			16.	Get Engaged	Yasmine Aceves	9/1/20	8/31/21	1	Mayor
			17.	Member	Annabelle Backman	5/1/20	4/30/22	1	City Council
			18.	Member	Christopher M. Brown	11/1/19	10/31/21	2	Mayor
			19.	Member	Victor Loo	11/1/19	10/31/21	1	Commission
			20.	Member	VACANT	5/1/20	4/30/22	1	Commission
			21.	Member	Jessi Murray	5/1/20	4/30/22	1	Commission

SELF-IDENTIFIED DIVERSITY CHART

	Men	Women	Transgender	Unknown	Asian (1)	Black/ African American (2)	Hispanic/ Latino (3)	American Indian/ Alaska Native (4)	Other (5)	Caucasian/ Non-Hispanic (6)	Pacific Islander (7)	Middle Eastern (8)	Multiracial (9)
Mayor	4	5				2	2		1	5			2
Council	3	1	1		2		1	1	1	1			1
Comm	1	2			1					3			
Total	8	8	1		3	2	3	1	2	9			3

Key:

***D** List the corresponding *Diversity Chart* number (1 through 9)
****G** List *gender*, **M** = Male, **F**= Female, **T**= Transgender, **U**= Unknown
RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01768, **Version:** 1

Reappointment of Manuel Venegas as member, Seattle LGBTQ Commission, for a term to October 31, 2021.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Manuel Venegas*		
Board/Commission Name: *Seattle LGBTQ Commission*		**Position Title:** *Commission Member*
☐ **Appointment** ***OR*** ☒ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ Council ☒ Mayor ☐ Other: *Fill in appointing authority*	**Date Appointed:**	**Term of Position: *** 11/1/2019 **to** 10/31/2021 ☐ *Serving remaining term of a vacant position*
Residential Neighborhood: *Roosevelt*	**Zip Code:** *98109*	**Contact Phone No.:**
Background: *Manuel Venegas is a first generation Mexican-American gay person living with HIV. His advocacy background started as a student in college advocating for all gender restrooms, environmental sustainability, and LGBTQ rights. This translates to his Commission policy work in the areas of restroom access in public accommodations, homelessness and housing affordability, community health engagement locations, and hate crimes/police relations. His current focus on HIV cure advocacy is based at Fred Hutch as a member of the defeat HIV Community Advisory Board and at Harborview Medical Center as a member of the AIDS Clinical Trials Unit Community Advisory Board. Manuel is a Washingtonian, who was born and raised in eastern Washington and has been living in Seattle since 2010. He enjoys spending time boating on the lakes and Salish Sea, reading a good book/policy, and traveling. Manuel has been serving as a Commissioner for the Seattle LGBTQ Commission and looks forward to his continued work.*		
Authorizing Signature (original signature): Jenny A. Durkan	**Appointing Signatory:** *Jenny A. Durkan* *Mayor of Seattle*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Manuel Venegas

PROFESSIONAL SKILLS SUMMARY

- Bicultural, bilingual, and bi-literate in Spanish

EDUCATION

University of Washington – Seattle
Bachelors of Arts degree – International Studies, Latin America and the Caribbean Sept 2015 – Mar 2017
Seattle Central College
Associate of Arts degree – Business Administration Sept 2013 – Jun 2015

EMPLOYMENT EXPERIENCE

Outbound Process Assistant, Amazon, Everett, WA Sept 2019 – Present
Prime Now Associate, Amazon, Seattle, WA Oct 2016 – Sept 2019
Market Researcher, Royal Cause, Seattle, WA Jun 2014 – Sept 2014
Merchandiser, Forever 21, Seattle, WA Apr 2011 – Dec 2013
Sales Associate, Aéropostale, Auburn, WA Oct 2010 – Apr 2011

AWARDS AND ACTIVITIES

International AIDS Society: AIDS 2020 Conference Coordinating Committee 2019 – 2020
International AIDS Society: Towards an HIV Cure Scholarship 2017
Conference on Retroviruses and Opportunistic Infections (CROI) Community Educator Scholarship 2017
University of Washington 2015 – 2017

- *Movimiento Estudantil Chicanx de Aztlán* (MEChA) member

University of Washington Dean's List Summer term 2016
Seattle Central College Dean's List Winter, Spring, Summer terms 2015
City of Seattle LGBTQ Commission, Mayoral appointment 2015 – Present
Conference on Cell and Gene Therapy for an HIV Cure Scientific Organizing Committee 2015 – 2019
Pedro Zamora Young Leaders Scholarship 2015 – 2017
Seattle Central College 2014 – 2015

- Queer – Straight Alliance co-president
- Associated Student Body intern for Student Advocacy Committee
- Sustainability Committee student representation in the Seattle Colleges District
- *Movimiento Estudantil Chicanx de Aztlán* (MEChA) member

National Minority AIDS Council (NMAC) Youth Scholar 2014
National Youth HIV & AIDS Awareness Day Ambassador 2013
Washington State AIDS Action & Awareness Day Legislative District 13 Lead 2013
defeatHIV Community Advisory Board member 2013 – Present
AIDS Clinical Trials Unit Community Advisory Board member 2013 – Present
NW Network Outspoken Speakers Bureau 2013 – 2016
Washington State AIDS Action & Awareness Day Legislative District 34 Representative 2012
Lifelong AIDS Alliance (Lifelong) Health Education Youth Outreach (HEYO) 2011 – 2014

PROFESSIONAL AFFILIATIONS

National Institutes of Health/Allergens and Infectious Diseases (NIH/NIAID), Martin Delaney Co-laboratories, National Advisory Board member
Fred Hutch, Martin Delaney Co-laboratories, defeatHIV Community Advisory Board (CAB) member
City of Seattle Office of Civil Rights, City of Seattle LGBTQ Commission, Commissioner
International AIDS Society, AIDS 2020 Conference Coordinating Committee, Youth Representative

Seattle Lesbian, Gay, Bisexual, Transgender and Queer Commission

September 2020

Members: Pursuant to *SMC 3.14.920, all* members subject to City Council confirmation, *2*-year terms:

- *8* City Council-appointed
- *9* Mayor-appointed
- *4* Other Appointing Authority-appointed: Commission-appointed

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
			1.	Member	Juan C. Rodriguez	5/1/19	4/30/21	1	City Council
			2.	Member	VACANT	5/1/19	4/30/21	1	Mayor
			3.	Member	Byram Simpson	5/1/19	4/30/21	2	City Council
			4.	Member	Latosha Correll	5/1/19	4/30/21	2	Mayor
			5.	Member	DeAunte Damper	5/1/19	4/30/21	1	City Council
			6.	Member	Manuel Venegas	11/1/19	10/31/21	3	Mayor
			7.	Member	Kari Lerum	11/1/19	10/31/21	2	Commission
			8.	Member	Steven Pray	11/1/19	10/31/21	1	Mayor
			9.	Member	VACANT	5/1/20	4/30/22	1	City Council
			10.	Member	Nathaniel Higby	5/1/20	4/30/22	1	Mayor
			11.	Member	Joseph Suttner	5/1/20	4/30/22	1	City Council
			12.	Member	Brett Pepowski	5/1/20	4/30/22	1	Mayor
			13.	Member	Michael B. Garrett	11/1/18	10/31/20	1	City Council
			14.	Member	Ryan Bush	11/1/20	10/31/22	1	Mayor
			15.	Member	Deepa Sivarajan	11/1/19	10/31/21	2	City Council
			16.	Get Engaged	Yasmine Aceves	9/1/20	8/31/21	1	Mayor
			17.	Member	Annabelle Backman	5/1/20	4/30/22	1	City Council
			18.	Member	Christopher M. Brown	11/1/19	10/31/21	2	Mayor
			19.	Member	Victor Loo	11/1/19	10/31/21	1	Commission
			20.	Member	VACANT	5/1/20	4/30/22	1	Commission
			21.	Member	Jessi Murray	5/1/20	4/30/22	1	Commission

SELF-IDENTIFIED DIVERSITY CHART

	Men	Women	Transgender	Unknown	Asian (1)	Black/ African American (2)	Hispanic/ Latino (3)	American Indian/ Alaska Native (4)	Other (5)	Caucasian/ Non-Hispanic (6)	Pacific Islander (7)	Middle Eastern (8)	Multiracial (9)
Mayor	4	5				2	2		1	5			2
Council	3	1	1		2		1	1	1	1			1
Comm	1	2			1					3			
Total	8	8	1		3	2	3	1	2	9			3

Key:

***D** List the corresponding *Diversity Chart* number (1 through 9)
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RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01769, **Version:** 1

Reappointment of Christopher M. Brown as member, Seattle LGBTQ Commission, for a term to October 31, 2021.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Christopher M. Brown*		
Board/Commission Name: *Seattle LGBTQ Commission*		**Position Title:** *Member*
☐ **Appointment** ***OR*** ☒ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ Council ☒ Mayor ☐ Other: *Fill in appointing authority*	**Date Appointed:**	**Term of Position: *** 11/1/2019 **to** 10/31/2021 ☒ *Serving remaining term of a vacant position*
Residential Neighborhood: *Washington Park*	**Zip Code:** *98122*	**Contact Phone No.*:***
Background: *Christopher (Chris) Brown has been serving as a Commissioner for the Seattle LGBTQ Commission. He is currently the Executive Chair at Out & Equal, a national non-profit dedicated to achieving LGBTQ workplace equality. Out & Equal partners with Fortune 1000 companies and government agencies to provide execute leadership development, comprehensive training and consultation, and professional networking opportunities.* *Chris has been a strong advocate for the LGBTQ Community. He is a Steering Committee Member of Victory Fund and Fighting for the Majority, both organizations that support LGBTQ candidates for elected office throughout the country.*		
Authorizing Signature (original signature): Jenny A. Durkan	**Appointing Signatory:** *Jenny A. Durkan* *Mayor of Seattle*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Christopher M. Brown

Work Experience

Out & Equal August 2012 – Present
Executive Chair – *Seattle, WA*

As a volunteer I work with our local Executive Committee to develop content for our Regional Summit for 4 years including plenary sessions, workshop content, negotiating of contracts for event spaces. We also developed quarterly educational roundtables, an annual LGBT career fair and our annual community event called the Pinknic. Each year I worked to develop an annual budget and developed year-over-year growth.

The Out & Equal Seattle Regional Affiliate is dedicated to helping employee resource groups (ERGs) foster an inclusive environment for all Pacific Northwest companies by fostering cross-company communication, sharing best practices, providing professional networking and development opportunities, and engaging in our communities.

Sales Partnerships International (American Express) August 2015 – September 2016
Quality Assurance Manager – *Seattle, WA*

Worked with 11 markets to engage field agents on Quality Assurance procedures. Our main focus was the success of OptBlue which allows small business customers to accept American Express along with Visa and MasterCard. We worked to ensure that small business customers understand they can now accept American Express which grants them access to a higher value customer and can help increase average purchase amounts in their store. This additional acceptance of American Express cards also spurs an increase in American Express card usage and American Express cardholders.

iHeartMedia August 2010 – June 2015
Director of Digital Sales – *Seattle, WA*

Worked with the local market and national markets to develop the digital marketing segment within iHeartMedia and iHeartRadio. This included Digital Sales Management, Digital Sales Growth, Training of sales staff on new tools and resources, Direct client contact, Homepage programming, Digital integration of Sales and Marketing packages, Analytics with SiteCatalyst, Google Analytics, Salesforce, Contest Administration, Worked with Programming, Promotions and Sales to develop effective marketing campaigns, HTML/CSS, Editing and implementation of PHP/MySQL, Graphic Design, All digital content (photos / videos / podcasts / blogs), Social Media campaigns and Brand integrity.

Bellevue College August 2008 – March 2010
Student – *Bellevue, WA*

Attended school full time to graduate with a degree in Information Systems & Software Development.

Bank of America 2004 - 2008
Senior Personal Banker Assistant Vice President - *Bellevue, WA*

Throughout my time with Bank of America I worked to coach our teller teams, my fellow personal bankers and our in-branch associates. We concentrated on customer service, sales & support, small business, mortgage loans and referrals to our business line partners in Premier Banking and Investment Services.

Intercontinental Hotels Group Inc (IHG) 2001 - 2004
Chatsworth, Torrance, San Diego, El Segundo, San Jose, CA and Seattle, WA

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Director of Sales

During my time with IHG I worked to re-brand a number of properties. This included identifying key business prospects and market share targets for development. For each area I would create a trace file system for the organization of hot leads, implement daily and monthly revenue tracking systems and assigned leads as needed to Sales Managers and Sales Coordinators. We would do coordinated sales blitzes for the new properties with the intention of filling the hotels with national accounts and agencies I managed. These national accounts included Exxon Mobile, AARCO, BP, American Honda, Toyota and Nissan.

Properties I worked with included: Staybridge Suites Chatsworth, Emerald Plaza San Diego, Intercontinental Hotel San Francisco, Staybridge Suites El Segundo, Staybridge Suites Torrance, Holiday Inn Carson and the Bel Age West Hollywood.

Education

Information Systems and Software Development Associate of Arts (91 credits) – Graduated March 2010
Introductory .NET Programming Certificate (45 credits) – Graduated March 2010
Bellevue College – Bellevue, WA

- Coursework includes: Database Applications, Systems Analysis & Design, Database Theory, Intro to Programming, Web Development II, Enterprise Applications, Networking Basics, Object-Oriented Programming, SQL & Relational Database Programming, Operating Systems, Intro to Computer Hardware, HTML & Web Page Development, Web Design & Development

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Seattle Lesbian, Gay, Bisexual, Transgender and Queer Commission

September 2020

Members: Pursuant to *SMC 3.14.920, all* members subject to City Council confirmation, *2*-year terms:

- *8* City Council-appointed
- *9* Mayor-appointed
- *4* Other Appointing Authority-appointed: Commission-appointed

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
			1.	Member	Juan C. Rodriguez	5/1/19	4/30/21	1	City Council
			2.	Member	VACANT	5/1/19	4/30/21	1	Mayor
			3.	Member	Byram Simpson	5/1/19	4/30/21	2	City Council
			4.	Member	Latosha Correll	5/1/19	4/30/21	2	Mayor
			5.	Member	DeAunte Damper	5/1/19	4/30/21	1	City Council
			6.	Member	Manuel Venegas	11/1/19	10/31/21	3	Mayor
			7.	Member	Kari Lerum	11/1/19	10/31/21	2	Commission
			8.	Member	Steven Pray	11/1/19	10/31/21	1	Mayor
			9.	Member	VACANT	5/1/20	4/30/22	1	City Council
			10.	Member	Nathaniel Higby	5/1/20	4/30/22	1	Mayor
			11.	Member	Joseph Suttner	5/1/20	4/30/22	1	City Council
			12.	Member	Brett Pepowski	5/1/20	4/30/22	1	Mayor
			13.	Member	Michael B. Garrett	11/1/18	10/31/20	1	City Council
			14.	Member	Ryan Bush	11/1/20	10/31/22	1	Mayor
			15.	Member	Deepa Sivarajan	11/1/19	10/31/21	2	City Council
			16.	Get Engaged	Yasmine Aceves	9/1/20	8/31/21	1	Mayor
			17.	Member	Annabelle Backman	5/1/20	4/30/22	1	City Council
			18.	Member	Christopher M. Brown	11/1/19	10/31/21	2	Mayor
			19.	Member	Victor Loo	11/1/19	10/31/21	1	Commission
			20.	Member	VACANT	5/1/20	4/30/22	1	Commission
			21.	Member	Jessi Murray	5/1/20	4/30/22	1	Commission

SELF-IDENTIFIED DIVERSITY CHART

	Men	Women	Transgender	Unknown	Asian (1)	Black/ African American (2)	Hispanic/ Latino (3)	American Indian/ Alaska Native (4)	Other (5)	Caucasian/ Non-Hispanic (6)	Pacific Islander (7)	Middle Eastern (8)	Multiracial (9)
Mayor	4	5				2	2		1	5			2
Council	3	1	1		2		1	1	1	1			1
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***D** List the corresponding *Diversity Chart* number (1 through 9)
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RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Legislation Text

File #: Appt 01770, **Version:** 1

Reappointment of Latosha Correll as member, Seattle LGBTQ Commission, for a term to April 30, 2021.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Latosha Correll*		
Board/Commission Name: *Seattle LGBTQ Commission*		**Position Title:** *Member*
☐ **Appointment** ***OR*** ☒ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ Council ☒ Mayor ☐ Other:	**Date Appointed:**	**Term of Position: *** 5/1/2019 **to** 4/30/2021 ☐ *Serving remaining term of a vacant position*
Residential Neighborhood: Georgetown	**Zip Code:** 98109	**Contact Phone No.*:***

Background:

Latosha (or "Tosha", as her friends call her) is passionate about building community through the arts as well as creating and supporting sustainable, positive, and innovative solutions to issues facing LGBTQ+ community members and their families. She has been serving as a Commissioner for the Seattle LGBTQ Commission and looks forward to her continued work.

Currently, Latosha is the Chair of the People of Color Stakeholder Committee (POCS) on the Seattle LGBTQ Commission. Through her strong leadership the Commission will develop a community survey specifically for queer and trans people of color (QTPOC), strengthen their partnership with the Alphabet Alliance of Color and other QTPOC organizations/coalitions, and continue to work with the Human Services Department in response to the City Council SLI regarding improving homelessness services for the LGBTQ Community.

Over the decades, Latosha has advocated for LGBTQ+ rights and visibility by walking in the Pride Parade with various organizations she has worked with such as Verizon Wireless and volunteering her time with non-profits such as Equal Rights Washington, Seattle AIDS Support Group and Lifelong AIDS Alliance.

In 2016, Latosha co-founded Mistresspiece Theater, a LGBTQ-centered community performing arts organization focused on supporting women and the LGBTQ community with opportunities in all theater disciplines.

Authorizing Signature (original signature): Jenny A. Durkan	**Appointing Signatory:** *Jenny A. Durkan* *Mayor of Seattle*

**Term begin, and end date is fixed and tied to the position and not appointment date.*

Last revised July 19, 2016

Latosha Correll

PROFILE

Entrepreneurial-minded community activist who is energized by solving complex problems while building relationships. I help businesses and organizations by giving recommendations and making process improvements that save money and increase stakeholder satisfaction.

EXPERIENCE

Dental Program Coordinator
Lifelong, 2/18-Present – Seattle, WA

- Support by phone and in person gender-diverse clients, staff, and volunteers of varied socio-economic, ethnic, religious and sexual-orientation backgrounds to assist clients in reducing barriers to dental and health based needs.
- Recognized for Microsoft Office skills by taking lead duty of generating monthly reports for all our 30 dental providers.
- Promoted to specialist referrals within 2 months of hire date.

Social Media Analyst
BCforward, 3/17-2/2018 – Seattle, WA

- Analyzed on average 800+ social media posts a day which resulted in personal feedback and suggestions for software engineers.
- Introduced and facilitated bi-weekly wellness classes for my team of 14.

Business Claims Analyst
Precor, 3/13-7/16 – Woodinville, WA

- Co-wrote & Introduced the Claims Analyst training manual and taught in-person classes on business processes.

- Contributed to creating and executing games, activities and events with the Fun Committee.
- Saved a monthly average of $2,925 using auditing processes.
- Produced monthly reports for manager meetings.
- Generated communication via monthly vendor newsletters as well as email and phone calls with customers.

Business Services Coordinator,
Verizon Wireless, 11/02-7/12 – Bellevue, WA

- Contributed to Correspondence Team's transition from manual processes to automation.
- Increased productivity by reducing turnaround time from 48 hours to 24 hours; saved the company $1,950 dollars a day.
- Decreased personal 3-day repeat caller percentage by 3%, which saved the company over $10,000 a month.

Volunteer

- **WA Technology Industry Assoc., Ion Program**, 6/18- Present, Seattle WA

  Collaborator and facilitator. Ion is a collaboration incubator that brings together tech, government and nonprofits to tackle community challenges.

- **Mistresspiece Theater**, Co-Founder 1/16-Present, Seattle, WA

  Create and manage budget. Our mission is to produce plays with positive, strong female and LGBTQ stories to promote visibility and equality through theater arts.

EDUCATION Strayer University, Business Administration 2008-2010

Seattle Lesbian, Gay, Bisexual, Transgender and Queer Commission
September 2020

Members: Pursuant to *SMC 3.14.920, all* members subject to City Council confirmation, *2*-year terms:

- *8* City Council-appointed
- *9* Mayor-appointed
- *4* Other Appointing Authority-appointed: Commission-appointed

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
			1.	Member	Juan C. Rodriguez	5/1/19	4/30/21	1	City Council
			2.	Member	VACANT	5/1/19	4/30/21	1	Mayor
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			7.	Member	Kari Lerum	11/1/19	10/31/21	2	Commission
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			9.	Member	VACANT	5/1/20	4/30/22	1	City Council
			10.	Member	Nathaniel Higby	5/1/20	4/30/22	1	Mayor
			11.	Member	Joseph Suttner	5/1/20	4/30/22	1	City Council
			12.	Member	Brett Pepowski	5/1/20	4/30/22	1	Mayor
			13.	Member	Michael B. Garrett	11/1/18	10/31/20	1	City Council
			14.	Member	Ryan Bush	11/1/20	10/31/22	1	Mayor
			15.	Member	Deepa Sivarajan	11/1/19	10/31/21	2	City Council
			16.	Get Engaged	Yasmine Aceves	9/1/20	8/31/21	1	Mayor
			17.	Member	Annabelle Backman	5/1/20	4/30/22	1	City Council
			18.	Member	Christopher M. Brown	11/1/19	10/31/21	2	Mayor
			19.	Member	Victor Loo	11/1/19	10/31/21	1	Commission
			20.	Member	VACANT	5/1/20	4/30/22	1	Commission
			21.	Member	Jessi Murray	5/1/20	4/30/22	1	Commission

SELF-IDENTIFIED DIVERSITY CHART

	Men	Women	Transgender	Unknown	Asian (1)	Black/ African American (2)	Hispanic/ Latino (3)	American Indian/ Alaska Native (4)	Other (5)	Caucasian/ Non-Hispanic (6)	Pacific Islander (7)	Middle Eastern (8)	Multiracial (9)
Mayor	4	5				2	2		1	5			2
Council	3	1	1		2		1	1	1	1			1
Comm	1	2			1					3			
Total	8	8	1		3	2	3	1	2	9			3

Key:

***D** List the corresponding *Diversity Chart* number (1 through 9)
****G** List *gender*, **M** = Male, **F**= Female, **T**= Transgender, **U**= Unknown
RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01771, **Version:** 1

Appointment of Ryan Bush as member, Seattle LGBTQ Commission, for a term to October 31, 2022.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Ryan Bush*		
Board/Commission Name: *Seattle LGBTQ Commission*		**Position Title:** *Commission Member*
☒ **Appointment** ***OR*** ☐ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ Council ☒ Mayor ☐ Other: *Fill in appointing authority*	**Date Appointed:**	**Term of Position: *** 11/1/2020 **to** 10/31/2022 ☒ *Serving remaining term of a vacant position*
Residential Neighborhood: *Maple Leaf*	**Zip Code:** *98115*	**Contact Phone No.:**

Background:

Ryan Bush is a recent transplant to Seattle by the way of Tennessee. Ryan currently serves as the Senior Manager of Marketing and Communications for the nonprofit organization, Commute Seattle. He has over nine years of experience developing digital and traditional B2B and B2C marketing campaigns. He oversees the organization's brand and manages marketing and communication efforts. Additionally, he is responsible for ongoing initiatives including branding, campaign management, press, and the free waterfront shuttle. He is passionate about creating campaigns that connect people to their community and has seen, first-hand, the difference mission-driven marketing campaigns can make. He has spent most of his career strategically planning and placing award winning advertising campaigns within the public sector. He is passionate about promoting sustainable transportation choices for all people of greater Seattle. Ryan is an active member of Seattle Neighborhood Greenways Northeast and can be found on his bike, hiking with his dogs, or enjoying local coffee and beers with his fiancé, Chad.

Authorizing Signature (original signature): Jenny A. Durkan	**Appointing Signatory:** *Jenny A. Durkan* *Mayor of Seattle*

**Term begin and end date is fixed and tied to the position and not the appointment date.*

RYAN BUSH

STRATEGIC MARKETING MANAGER

ABOUT ME

Strategic marketing and communications manager with over 9 years of experience in digital and traditional advertising, events, branding and project management. Savvy digital marketer with a consistent track record of generating B2B leads.

Seattle, WA

EDUCATION

BBA IN MARKETING MANAGEMENT
University of Memphis 2010
GPA 3.5
Major GPA 3.8

EXPERIENCE

SENIOR MANAGER MARKETING & COMMUNICATIONS

Commute Seattle | Nov 2018- Present

- Leads a rebrand and website development project for the organization and accurately track budget and ensure on-time delivery
- Support all programs and developed the first organizational marketing process to use the brand voice and elements I strategically developed
- Manage and train a marketing specialist that exceeded lead generation goals by 15% by creating and launching the ORCA for Business paid advertising and content marketing campaigns.
- Produce all content including social media, website, newsletter and press resulting in an increase of social impressions by 7%
- Oversee the Free Waterfront Shuttle and manage a $400K advertising campaign resulting in over 320K shuttle riders

MARKETING MANAGER

TN Dept. of Economic & Community Development | May 2014- Aug 2018

- Planned and purchased all media for a $1.3 million multi-channel marketing budget by developing strategies to generate qualified business leads and website traffic
- Oversaw the development of all B2B marketing campaigns, such as "Mastered in Tennessee", including concepting, copywriting and managing creative and production deliverable deadlines
- Generated over 40 million impressions and qualified online conversions by transitioning advertising to a 90% behavior targeted digital strategy
- Dramatically increased web sessions by 900% by leading a full website UX redesign of TNECD.com
- Analyzed monthly advertising and web properties and developed reporting materials, metrics and recommendations to the Governor
- Accelerated Facebook content and advertising strategy to increase page likes by 930% and became the most liked EDO page on Facebook
- Organized annual Governor's Conference with 800+ attendees with a budget of $300K and led two marketing education seminars

DIGITAL ACCOUNT MANAGER

G/O Digital | Jan 2012- May 2014

- Provided strategic analysis and insight into the performance of client's marketing campaigns and made recommendations in order to improve results
- Maintained a book of business valued at over $600K, including approximately 250 projects
- Worked directly with design and web development teams on project plans including UX, design, campaign and messaging strategy
- Increased orders to an e-commerce website by 40% from a digital campaign

ACCOUNT COORDINATOR

Sullivan Branding | Jan 2011- Jan 2012

- Increased brand awareness and ticket sales for University of Memphis athletics by developing creative and messaging strategies
- Managed the creative process for digital, print, traditional, collateral, broadcast and radio for 12 client accounts

Seattle Lesbian, Gay, Bisexual, Transgender and Queer Commission
September 2020

Members: Pursuant to *SMC 3.14.920, all* members subject to City Council confirmation, *2*-year terms:

- *8* City Council-appointed
- *9* Mayor-appointed
- *4* Other Appointing Authority-appointed: Commission-appointed

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
			1.	Member	Juan C. Rodriguez	5/1/19	4/30/21	1	City Council
			2.	Member	VACANT	5/1/19	4/30/21	1	Mayor
			3.	Member	Byram Simpson	5/1/19	4/30/21	2	City Council
			4.	Member	Latosha Correll	5/1/19	4/30/21	2	Mayor
			5.	Member	DeAunte Damper	5/1/19	4/30/21	1	City Council
			6.	Member	Manuel Venegas	11/1/19	10/31/21	3	Mayor
			7.	Member	Kari Lerum	11/1/19	10/31/21	2	Commission
			8.	Member	Steven Pray	11/1/19	10/31/21	1	Mayor
			9.	Member	VACANT	5/1/20	4/30/22	1	City Council
			10.	Member	Nathaniel Higby	5/1/20	4/30/22	1	Mayor
			11.	Member	Joseph Suttner	5/1/20	4/30/22	1	City Council
			12.	Member	Brett Pepowski	5/1/20	4/30/22	1	Mayor
			13.	Member	Michael B. Garrett	11/1/18	10/31/20	1	City Council
			14.	Member	Ryan Bush	11/1/20	10/31/22	1	Mayor
			15.	Member	Deepa Sivarajan	11/1/19	10/31/21	2	City Council
			16.	Get Engaged	Yasmine Aceves	9/1/20	8/31/21	1	Mayor
			17.	Member	Annabelle Backman	5/1/20	4/30/22	1	City Council
			18.	Member	Christopher M. Brown	11/1/19	10/31/21	2	Mayor
			19.	Member	Victor Loo	11/1/19	10/31/21	1	Commission
			20.	Member	VACANT	5/1/20	4/30/22	1	Commission
			21.	Member	Jessi Murray	5/1/20	4/30/22	1	Commission

SELF-IDENTIFIED DIVERSITY CHART

	Men	Women	Transgender	Unknown	Asian (1)	Black/ African American (2)	Hispanic/ Latino (3)	American Indian/ Alaska Native (4)	Other (5)	Caucasian/ Non-Hispanic (6)	Pacific Islander (7)	Middle Eastern (8)	Multiracial (9)
Mayor	4	5				2	2		1	5			2
Council	3	1	1		2		1	1	1	1			1
Comm	1	2			1					3			
Total	8	8	1		3	2	3	1	2	9			3

Key:

***D** List the corresponding *Diversity Chart* number (1 through 9)
****G** List *gender*, **M** = Male, **F**= Female, **T**= Transgender, **U**= Unknown
RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01772, **Version:** 1

Appointment of Nathaniel Higby as member, Seattle LGBTQ Commission, for a term to April 30, 2022.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Nathaniel Higby*		
Board/Commission Name: *Seattle LGBTQ Commission*		**Position Title:** *Member*
☒ **Appointment** ***OR*** ☐ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ Council ☒ Mayor ☐ Other: *Fill in appointing authority*	**Date Appointed:**	**Term of Position: *** 5/1/2020 **to** 4/30/2022 ☐ *Serving remaining term of a vacant position*
Residential Neighborhood: *Capitol Hill*	**Zip Code:** *98122*	**Contact Phone No.*:***

Background:

For the past year, Nate Higby has been serving as a Get Engage Commissioner for the Seattle LGBTQ Commission. He graduated with a bachelor's degree in Sociology from Whitman College, Washington and works at Virginia Mason Medical Center where he does continuous improvement consulting and is an active member of the LGTQB staff committee. A life-long Pacific Northwestern, Nate is passionate about social justice, especially dismantling systems of oppression. Nate has spent time advocating for both disability and LGTBQ rights. In 2018, Nate was able to participate in a civil rights pilgrimage in the South and heard firsthand from foot soldiers about the importance of civic engagement. Since then, Nate has been committed to serving the community by working with a variety of local organizations in Seattle, including Year Up, Common Purpose, Yesler Terrace's Youth Tutoring Program, and United Way. When not working or volunteering, Nate likes to train for marathons and try new restaurants around Capitol Hill.

Authorizing Signature (original signature): Jenny A. Durkan	**Appointing Signatory:** *Jenny A. Durkan* *Mayor of Seattle*

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Nathaniel Higby

Education

Whitman College, Walla Walla, WA: Bachelor of Arts in Sociology with Distinction

Work Experience

Virginia Mason Medical Center — Seattle, WA

Virginia Mason Production System (VMPS) Specialist, Kaizen Promotion Office — *February 2018 - Current*

- Serve as technical expert of VMPS/Lean implementation, collaborating with leaders across the health system to integrate VMPS into operations
- Train and coach 30+ organizational leaders in VMPS principals and workshop facilitation
- Facilitate cross-departmental improvement activities (e.g. target setting, kaizen workshops, weekly huddles, innovation)
- Conducted experience based studies using surveys, interviews, and observations to capture care gaps and emotional touch points for patients and providers in Orthopedics and Physical Medicine and Rehabilitation
- Co-founder of department's psychological safety sub-team, focusing on education and coaching of team members
- Member of Virginia Mason's LGBTQ's staff committee, collaborating with leaders, providers, and community partners to ensure access to safe and equitable care for LGBTQ patients

Physician Recruiting Coordinator, Provider Services — *March 2016 – February 2018*

- Managed over 230+ onsite interview visits; served as host for candidates and responsible for education on Virginia Mason and VMPS; strategized with hiring managers to improve candidate experience; managed candidate flow in high volume environment
- Responsible for communicating key provider information to downstream customers; conducted sensitive data entry into HR systems; performed administrative duties
- Project lead on Provider SharePoint Team Site implementation; collaborated with key stakeholders; facilitated roll-out plan development
- Improved business through Virginia Mason Production/Toyota Production System Tools:
  - Led a Kaizen event which implemented mistake-proofing measures to Physician Recruiting information flow to downstream customers, improving quality by 68% and reducing from nine to one information source
  - Created and implemented team production board to track capacity and identify needs for level-loading or problem solving
  - Utilized process flow tools to capture and understand information flows in complex recruiting processes, including internal transfers and fellowship recruitment; conducted root cause analysis to generate meaningful counter-measures.

Administrative Intern, Kaizen Promotion Office — *November 2015- March 2016*

- Provided administrative support to a department of 12 improvement specialists and four directors; created standard work to document processes; oversaw office supplies and reorders; facilitated weekly staff-wide Report Out meetings
- Performed complex scheduling for executive leaders and directors for improvement events; performed data analysis
- Led a Kaizen event which decreased repetitive rework, reduced processing time, and streamlined communications with department customers

House of Representatives — District of Columbia

American Association of People with Disabilities Congressional Intern — *May 2015 – August 2015*

Whitman College — Walla Walla, WA

College Coach Intern — *May 2014- May 2015*

Office for Civil Rights, Department of Education — Seattle, WA

Civil Rights Intern — *May 2014- August 2014*

Leadership Experience

Whitman Events Board Co-Sponsorship Chair — *May 2014- May 2015*

- Coached and led 25+ students to execute over two dozen campus-wide events; managed a budget of $16,000

Associated Students of Whitman College Club Director — *August 2013- May 2014*

- Developed club leaders through one-on-one mentorship; facilitated bi-weekly club leader symposium; enforce compliance with college regulations; participated in executive council meetings

Other experiences: Resident Advisor, Senate Ombudsman, Class Senator, Student Affairs Council Member

Term begin and end date is fixed and tied to the position and not the appointment date.

Awards and Certifications

- 2015 Eugene Marx "Unsung Hero" Award for outstanding service to Whitman College community
- Virginia Mason Production System for Leaders and Advanced VMPS
- Crucial Conversations; Coaching for Development Excellence; and Situational Leadership

Skills and Abilities

- Proficiency in Microsoft Office Applications, Oracle, Survey Monkey, Kronos, Adobe, Taleo, & SharePoint
- Advanced experience and training in research methods, Cerner, EBD, statistical analysis, computer design, and conflict mediation

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Seattle Lesbian, Gay, Bisexual, Transgender and Queer Commission
September 2020

Members: Pursuant to *SMC 3.14.920, all* members subject to City Council confirmation, *2*-year terms:

- *8* City Council-appointed
- *9* Mayor-appointed
- *4* Other Appointing Authority-appointed: Commission-appointed

Roster:

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			20.	Member	VACANT	5/1/20	4/30/22	1	Commission
			21.	Member	Jessi Murray	5/1/20	4/30/22	1	Commission

SELF-IDENTIFIED DIVERSITY CHART

	Men	Women	Transgender	Unknown	(1) Asian	(2) Black/ African American	(3) Hispanic/ Latino	(4) American Indian/ Alaska Native	(5) Other	(6) Caucasian/ Non-Hispanic	(7) Pacific Islander	(8) Middle Eastern	(9) Multiracial
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RD Residential Council District number 1 through 7 or N/A

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Diversity information is self-identified and is voluntary.

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Legislation Text

File #: Appt 01773, **Version:** 1

Reappointment of Jessi Murray as member, Seattle LGBTQ Commission, for a term to April 30, 2022.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Jessi Murray*		
Board/Commission Name: *Seattle LGBTQ Commission*		**Position Title:** *Member*
☐ **Appointment** ***OR*** ☒ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ Council ☐ Mayor ☒ Other: *Commission*	**Date Appointed:**	**Term of Position: *** 5/1/2020 **to** 4/30/2022 ☐ *Serving remaining term of a vacant position*
Residential Neighborhood: *Capitol Hill*	**Zip Code:** *98102*	**Contact Phone No.*:***

Background:

Jessi Murray has been a community activist, leader, and volunteer for more than half of her life, particularly in the realms of reproductive justice, healthcare access, and LGBTQ+ advocacy. She strives to always make a positive impact on the world, especially for marginalized communities, and that has led her down a variety of unexpected paths, from a then-unaccredited Olin College to her current job at an open-source software firm facilitating HIV and cancer research. She also enjoys singing and has found her way to several communities that blend social justice and music. A native of Massachusetts, she's been in Seattle for over 8 years, and you can usually find her in a coffee shop on Capitol Hill drinking an iced chai.

Jessi has been serving as a Commissioner for the Seattle LGBTQ Commission since 2017, has previously led as co-chair and looks forward to her continued work with the commission.

Authorizing Signature (original signature):	**Appointing Signatory:** *John Rodriguez* *Co-chair, on behalf of the Seattle LGBTQ Commission*

**Term begin and end date is fixed and tied to the position and not the appointment date.*

JESSI MURRAY

SUMMARY

A highly collaborative leader with an eye for the big picture. Able to balance technical constraints, large budgets, and user experience. A quick learner with a passion for helping others around me grow and thrive. I strive to make the world a better place to live for everyone, through technology, advocacy, and community.

PROFESSIONAL EXPERIENCE

PROGRAM MANAGER/UX DESIGNER, LABKEY SOFTWARE

July 2013 – Present (Seattle, WA)

Collaborate with external clients and product team to deliver open-source and customized LabKey Server releases (a platform for cancer-, HIV-, and other disease-related research data), with annual project budgets ranging from $50K to $1.5M. Manage a UX team with one direct report. Highlighted projects and accomplishments include:

- **LabKey UI Refresh:** Responded to user feedback to prioritize key scenarios to set the stage for mobile usage and increased usability, drove year-long design efforts to update the platform's UI
- **LabKey Biologics:** Designer and PM for LabKey's first stand-alone product, built to accelerate large molecule development, while working in partnership with Just Biotherapeutics
- **HICOR IQ:** Partnered with the HICOR group at the Fred Hutch to create a visualization platform based on oncology data from both health care claims data and clinical data to measure and improve adherence to recommended clinical treatment guidelines
- **CAVD DataSpace:** Successfully drove application through Beta and Launch milestones of application to present harmonized data from completed HIV vaccine studies for further cross-study analysis. Collaborated with SCHARP and Artefact to shape platform, data, and interface requirements
- **Argos Application:** Conducted interviews for, designed, and managed initial development for application and natural language processing tools for presenting clinical cancer data to researchers

PROGRAM MANAGER, MICROSOFT

July 2010 – June 2013 (Redmond, WA)

Planned features for Windows, balancing scheduling and resources across multiple teams in partnership. Accountable for designing and detailing feature behavior in technical specification documents, tracking design issues, and leading bug triage. Key features included:

- **Cloud Experience**: Account and credential integration with Windows Services, Logon UI
  - Filed one utility patent
- **YOU-Centered Experience**: Share platform, and display and projection settings
  - Issued 6 design patents

LOTUS CONNECTIONS PLUG-INS, QUALITY ASSURANCE CO-OP, IBM

June 2009 – August 2009 (Internship, Cambridge, MA)

- Performed manual testing for Lotus Connections plug-ins for both Windows and Linux systems
- Received additional projects and mentoring in usability and user experiences

LUXSCI EMAIL, CREATIVE CONSULTANT, LUX SCIENTIAE

June 2007 – August 2007, June 2008 – August 2008 (Internship, Norwood, MA)

- Performed manual testing on secure email client as well as wrote and updated help documentation

**Term begin and end date is fixed and tied to the position and not the appointment date.*

EDUCATION

FRANKLIN W. OLIN COLLEGE OF ENGINEERING – NEEDHAM, MA – BS: ENGINEERING (SYSTEMS)

New college concentrating on revitalizing engineering education in the US. Part of the 5th graduating class.

- Graduated May 2010, with a BS: Engineering (Systems) and a concentration in Studio Art
- Official blogger for Olin Admissions (2006-2009), Olin Prospectus Redesign Committee member (2008-2009), Arts/Humanities/Social Sciences Steering Committee member (2008-2009)
- Olin Alumni Council, Class of 2010 Representative (2010-2013)

MILLIS HIGH SCHOOL – MILLIS, MA – HIGH SCHOOL DIPLOMA

Valedictorian (#1 of 74) of the class of 2006, National Merit Scholar, President of National Honor Society

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ADDITIONAL LEADERSHIP AND COMMUNITY ENGAGEMENT

GET ENGAGED COMMISSIONER/CO-CHAIR, SEATTLE LGBTQ COMMISSION (2017 – PRESENT)

- Elected co-chair in Jan 2018, after 4 months on Commission
- Advise the Mayor and City Council on issues with specific impact on the LGBTQ community
- Testify at relevant meetings, engage in policy advocacy, and build partnerships with organizations to ensure that city policies are created with a lens toward intersectional LGBTQ+ experiences
- Specific focus on healthcare access, homelessness and housing policy

CHAIRPERSON, SEATTLE LADIES CHOIR (2013 – 2015)

- Chaired the Board of Directors for a 60+ member group with an annual budget of $30,000
- Organized fiscal sponsorship for 501(c)(3) status, and raised $3800 in new grant money
- Moved choir to higher capacity venues while maintaining a balanced budget
- Led efforts to finalize and adopt updated bylaws, mission statement, and diversity statement

POLICY & ADVOCACY COMMITTEE MEMBER, NORTHWEST ABORTION ACCESS FUND (2016 – PRESENT)

- Represent committee at WA HERRO (Health Equity & Reproductive Rights Organizations) coalition meetings, working to shape mission statement and advance policy goals
- Took on leadership role in efforts to monitor and report on relevant bills in Alaska, Idaho, and Oregon state legislatures. Created and documented detailed procedures for use in other states.
- Contributed to drafting efforts for WA Reproductive Health Equity Act, introduced in legislation in the 2018 session, as well as ongoing revisions for 2019 session

OTHER SELECTED LEADERSHIP & VOLUNTEER ROLES

- Organizer and Cofounder, Seattle Clinic Defense (2010 – present)
  - Cofounded grassroots organization devoted to supporting women seeking abortion and other reproductive services through frequent clinic escorting drives and other direct action
  - Currently partnering with NARAL Pro-Choice Washington and others around upcoming efforts around educating public about crisis pregnancy centers
- Educator and volunteer, Rain City Rock Camp for Girls (2014 – present)
  - Teach vocal lessons to girls and gender non-conforming youth as part of program to teach self-esteem, leadership, and social justice concepts through rock music
- Precinct Committee Officer (Acting, 43-1858), WA State Democrats (2017 – present)
- Volunteer, Washington United for Marriage (2012)
  - Canvassed and phone-banked for Referendum 74, which legalized same-sex marriage in WA
- Organizer, SlutWalk Seattle (2011)
  - Managed volunteers, raised funds, and coordinated permits for large scale rally and march against rape culture with approximately 1000 attendees

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Seattle Lesbian, Gay, Bisexual, Transgender and Queer Commission
December 2020

Members: Pursuant to *SMC 3.14.920, all* members subject to City Council confirmation, *2*-year terms:

- *8* City Council-appointed
- *9* Mayor-appointed
- *4* Other Appointing Authority-appointed: Commission-appointed

Roster:

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			5.	Member	DeAunte Damper	5/1/19	4/30/21	1	City Council
			6.	Member	Manuel Venegas	11/1/19	10/31/21	2	Mayor
			7.	Member	VACANT	11/1/19	10/31/21	1	Commission
			8.	Member	Steven Pray	11/1/19	10/31/21	1	Mayor
			9.	Member	VACANT	5/1/20	4/30/22	1	City Council
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			12.	Member	Brett Pepowski	5/1/20	4/30/22	1	Mayor
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			16.	Get Engaged	Yasmine Aceves	9/1/20	8/31/21	1	Mayor
			17.	Member	Annabelle Backman	5/1/20	4/30/22	2	City Council
			18.	Member	Christopher M. Brown	11/1/19	10/31/21	2	Mayor
			19.	Member	Victor Loo	11/1/19	10/31/21	1	Commission
			20.	Member	VACANT	5/1/20	4/30/22	1	Commission
			21.	Member	Jessi Murray	5/1/20	4/30/22	2	Commission

SELF-IDENTIFIED DIVERSITY CHART

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RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01774, **Version:** 1

Appointment of Brett Pepowski as member, Seattle LGBTQ Commission, for a term to April 30, 2022.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Brett Pepowski*		
Board/Commission Name: *Seattle LGBTQ Commission*		**Position Title:** *Commission Member*
☒ **Appointment** ***OR*** ☐ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ Council ☒ Mayor ☐ Other: *Fill in appointing authority*	**Date Appointed:**	**Term of Position: *** 5/1/2020 **to** 4/30/2022 ☐ *Serving remaining term of a vacant position*
Residential Neighborhood: *Columbia City*	**Zip Code:** *98118*	**Contact Phone No.:**
Background: *Brett is a queer science and health educator, originally from Chicago. Brett currently works for the Downtown Emergency Service Center, connecting adults in supportive housing to medical services. Outside of work, Brett proudly volunteers for Camp Ten Trees, an overnight camp for queer youth and youth of nontraditional families and supports Rainbow City Performing Arts as a lighting designer. As a commissioner, Brett hopes to increase access to healthcare and housing for the Seattle queer community, with a special focus on the queer+disabled community.*		
Authorizing Signature (original signature): Jenny A. Durkan	**Appointing Signatory:** *Jenny A. Durkan* *Mayor of Seattle*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Brett Pepowski

Experience and Service

Health Stabilization Specialist July 2019-Present
Downtown Emergency Services Center Seattle, WA
37.5 hours per week
Within a shelter and four permanent supportive housing sites, collaborates with clients and case managers to determine clients' health goals and necessary supports. Schedules and arranges transport to doctor appointments, food banks, and other outings.

- Builds rapport and practices harm reduction techniques to connect with hesitant clients.
- Leverages knowledge of LGBTQIA+ and disabled communities to provide appropriate help.

Cabin Counselor, Area Lead August 2018-Present
Camp Ten Trees Seattle, WA
479 hours total
Engaged LGBTQIA+ youth in social justice & other activities as they explored their identities.

- Developed and presented a Disability Justice training for other volunteers.
- Supported inclusion of campers by adapting activities to their mental and physical needs.
- As Area Lead, collaborated with Cabin Counselors to resolve camper conflicts.

Science Education Fellow September 2016-June 2018
Science in Society, Northwestern University Evanston, IL
40 hours per week
Collaborated with four other Fellows to plan and implement study skills/biology review curriculum in small tutoring sessions at highly diverse Chicago Public High School. Assisted teachers by answering student questions, communicating their needs to teachers, and creating tailored lesson plans.

- Led preparations for annual student field trip to Northwestern, coordinating with other Fellows, teachers, office staff, and Northwestern lab hosts.
- Supported supervisor by helping building partnerships with teachers, helping interview incoming Fellows, and creating orientation, LGBTQ, and other reference materials.

Stage Manager November 2018-February 2019
Chicago Musical Theatre Festival Chicago, IL
1-27 hours per week
Coordinated rehearsal scheduling and location for a musical. Communicated schedule, rehearsal expectations, etc. to actors. Directed load-in and load-out of set and props. Called cues during shows.

- Coordinated pre-rehearsal preparations with out-of-town staff.
- Developed and delivered key documentation and paperwork to directors.

Education

The University of Chicago October 2012-June 2016
B.A. Biology, concentration in Microbiology Chicago, IL
Cumulative GPA: 3.61
Honors included: Dean's List 2013 - 2016; Beatrice Garber Summer Scholar 2014

Skills

Languages: Spanish, American Sign Language, Latin (proficient); French, Polish, Hindi (conversant).
Computer: Microsoft Suite, G-Suite.
Other: First Aid/CPR/AED (2018-2020). Red Cross EMR (2014-2016).

Seattle Lesbian, Gay, Bisexual, Transgender and Queer Commission

September 2020

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			16.	Get Engaged	Yasmine Aceves	9/1/20	8/31/21	1	Mayor
			17.	Member	Annabelle Backman	5/1/20	4/30/22	1	City Council
			18.	Member	Christopher M. Brown	11/1/19	10/31/21	2	Mayor
			19.	Member	Victor Loo	11/1/19	10/31/21	1	Commission
			20.	Member	VACANT	5/1/20	4/30/22	1	Commission
			21.	Member	Jessi Murray	5/1/20	4/30/22	1	Commission

SELF-IDENTIFIED DIVERSITY CHART

	Men	Women	Transgender	Unknown	Asian (1)	Black/ African American (2)	Hispanic/ Latino (3)	American Indian/ Alaska Native (4)	Other (5)	Caucasian/ Non-Hispanic (6)	Pacific Islander (7)	Middle Eastern (8)	Multiracial (9)
Mayor	4	5				2	2		1	5			2
Council	3	1	1		2		1	1	1	1			1
Comm	1	2			1					3			
Total	8	8	1		3	2	3	1	2	9			3

Key:

***D** List the corresponding *Diversity Chart* number (1 through 9)
****G** List *gender*, **M** = Male, **F**= Female, **T**= Transgender, **U**= Unknown
RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01775, **Version:** 1

Appointment of Hannah Wilson as member, Seattle Commission for People with Disabilities, for a term to April 30, 2021.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Hannah Wilson*		
Board/Commission Name: *Seattle Commission for People with disAbilities*		**Position Title:** *Member*
☒ **Appointment** ***OR*** ☐ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ Council ☒ Mayor ☐ Other: *Fill in appointing authority*	**Date Appointed:**	**Term of Position: *** 5/1/2019 **to** 4/30/2021 ☒ *Serving remaining term of a vacant position*
Residential Neighborhood: *Capitol Hill*	**Zip Code:** *98102*	**Contact Phone No.*:***
Background: For the past year, Hannah has been serving as a Get Engage Commissioner on the Seattle Commission for People with disAbilities and looks forward to her continued work. She graduated from the University of Washington where she studied Environmental Science & Terrestrial Resource Management and minored in Geography. During her time there she dove into her passions for environmental justice and landscape ecology in her studies and work around Seattle. She is interested in the ways that urban and environmental planning can address the intersections of public health, environmental conservation, and other social justice issues within POC, low-income, LGBTQI+, Disabled, and other vulnerable communities. She has bilateral hearing loss and uses a hearing aid and cochlear implant, hoping to deepen her advocacy work in disability justice in the Seattle community, among other goals.		
Authorizing Signature (original signature): Jenny A. Durkan	**Appointing Signatory:** *Jenny A. Durkan* *Mayor of Seattle*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

HANNAH WILSON

Ecological Restoration · Community Outreach · Environmental Justice

A driven environmental justice advocate aspiring to collaborate and build relationships with communities to achieve community, economic, and environmental health. Deep understanding and lived experience of the ways Black, Indigenous, and people of color face disparities in access to nutritious food, green spaces, education, healthcare, housing, and employment, all of which will be exacerbated by climate change and gentrification. Committed and invested in advocating for the transformative change needed to create equitable and sustainable cities and neighborhoods through urban planning, public policy, and natural resource management.

PROFESSIONAL HIGHLIGHTS

EarthCorps, **Outreach Specialist (**January 2020 – Present)
EarthCorps is a Seattle-based non-profit organization that develops leaders to strengthen community and restore the health of our environment through environmental service. Outreach support including representing organization at tabling events, running social media, producing marketing materials, and coordinating and delivering presentations on EarthCorps' behalf.

The Harvey Lab, **Research Assistant (**June 2019 – October 2019)
Work centered on questions about the characteristics and consequences of fire in Washington's forests, as well as on long-term dynamics in old-growth forest plots. The lab also has a focus on forest management with multiple stakeholders for long-term sustainability, especially considering the implications of climate change.

Quinault Division of Natural Resources Department in Environmental Protection, **Intern, Doris Duke Conservation Scholars Program at UW - Year 2 (**June 2018 - August 2018)
Focused on Moses Prairie Restoration Project doing Vegetation Monitoring to collect data on how binging back the tradition land management practice of burning help deal with encroaching trees and shrubs, and increase culturally important plant and animal species.

Urban Forest Restoration Intern, Nature Consortium (January 2018 - June 2018)
A grassroots, community-based organization whose mission is to connect people, arts and nature. My role was within the Urban Forest Restoration Program.

Intern, Doris Duke Conservation Scholars Program at UW - Year 1 (June 2017 – June 2018)
Two-summer 8-week program that focuses on biodiversity conservation, environmental justice and leadership skill development

Marketing Intern, Global Visionaries (January 2016 – June 2016)
Global Visionaries facilitates a multi-year youth leadership program with an emphasis on social justice and environmentalism.

ACHIEVEMENTS AND AWARDS

Panelist at GoGreen Conference: Empowering Conservation & Climate Action Leadership Through Youth Career Pathways (April 2018)

- Spoke on experience in the environmental field and as a young leader, including barriers, experiences, and solutions. Participated in a Q & A afterwards.

Speaker at Restoring Resilient Communities in Changing Landscapes Conference (October 2018)

- Invited by the Society of Ecological Restoration NW Chapter
- Gave a presentation on the importance of having people from diverse backgrounds be involved with restoration and other conservation work.

Poster Presentation at Senior Capstone, New Horizons Conference in Chicago, and UW Annual Research Symposium (2019)

- Presented research on the importance of integrating indigenous knowledge and western science for the future of restoration and conservation as a whole.

Keynote Speaker at Salish Sea Equity and Justice Symposium (November 2019)

- 20 minute speech at the Intellectual House at the University of Washington honoring the Salish ancestral lands, intersectional identities, and how my identity shapes my work and experience in the environmental field, including my vision for the future (Link).

Article for Washington Wild Newsletter (2020)

**Term begin and end date is fixed and tied to the position and not the appointment date.*

- Topic of importance of healthy forests in the fight against the climate crisis (Link).

HerRay! Sheroes Fellow through EarthCorps (2020)

- An ambassador to other women/nonbinary folks trying to enter the environmental field and will serve as inspiration for other young women who aspire to lead.

Poster Presentation at New Horizons Conference in Ann Arbor, MI (TBD due to COVID-19, 2020)

- Presented research on the importance of integrating creating support systems within environmental NGO's for BIPOC through racial caucusing and resource groups, as well as sharing resources with BIPOC-led organizations that actually increases capacity.

VOLUNTEER

Green Plate Special (2015)

- Garden management. 4 hrs/week for 3 months.

DJ at Rainy Dawg Radio (2018-2019)

- Curated playlists for weekly show, collaborated with co-host in creating promotion content on social media and developing ideas for on air discussion based on how to prop up women of color in the music industry and beyond. Completed volunteer hours tabling and DJing at campus events. 1 hr/week for 6 quarters at UW.

Missing Maps (2019)

- Helped create GIS data for rural maps to aid emergency systems

Act Six Scholarship Application Reader (2020)

- 30 hours reading and scoring 110 applications for full-ride leadership scholarship

Commissioner on the Seattle Disabilities Commission (2019-present)

- Selected to be part of the YMCA's GetEngaged 2019-2020 Cohort and serve on a Seattle commission
- Worked on outreach for the commission, task forces, and presented on equity to cohort (4 hrs/month)

Got Green Movement School (2020)

- 16 hours connecting and learning more about environmental justice and how to organize with local organizations and other activists in Seattle.

350.org Climate Justice Leadership Program (2020)

- Online training modules with assignments to train up emerging BIPOC leaders to organize with a climate justice lens, capacity build around 350.org campaigns, and provide resources to organize regionally.

Community Alliance for Global Justice Rise UP! Summer Program (2020)

- Critical analysis and discussion of literature around food sovereignty, food justice, food insecurity, impacts of oppression on food systems, and application to current-day organizing.

Uprooted and Rising (2020)

- Collective of local BIPOC organizers addressing issues of food justice and food sovereignty, used this network to intentionally increase the impact of my work at Yes Farm and the Black Farmers Collective, and resource sharing.

SKILLS

Proficient in Spanish

Proficient in MS Office including Word, PowerPoint, Publisher etc.
Experience with Salesforce
Wilderness First Aid and CPR Certified
3 Courses in GIS using ArcMap
Various methods of data collection and analysis through fieldwork experience

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EDUCATIONAL BACKGROUND

University of Washington (2015-2019). Seattle, Washington. Obtained BS in Environmental Science & Resource Management with minor in Geography.

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Seattle Commission for People with Disabilities
September 2020

21 Members: Pursuant to *SMC 3.14.920,* all members subject to City Council confirmation, *2*-year terms:

- *8* City Council-appointed
- *9* Mayor-appointed (includes 1 Get-engaged Mayor position)
- *4* Other Appointing Authority-appointed (specify): Commission-appointed

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
9	F	3	1.	Member	Hannah Wilson	5/01/19	4/30/21	1	Mayor
			2.	Member	VACANT	5/01/19	4/30/21	1	City Council
6	M	7	3.	Member	Eric L. Scheir	5/01/17	4/30/19	1	Mayor
6	M	6	4.	Member	Jayson Morris	5/01/19	4/30/21	2	City Council
			5.	Member	VACANT	11/1/19	10/31/21	1	Mayor
			6.	Member	VACANT	11/1/19	10/31/21	1	City Council
2	NB	5	7.	Member	ChrisTiana ObeySumner	11/1/17	10/31/19	2	Mayor
			8.	Member	VACANT	11/1/19	10/31/21	1	Commission
4	F		9.	Member	Kristina Sawyckyj	5/01/18	4/30/20	1	City Council
2	F	3	10.	Member	Anquida Adams	5/01/18	4/30/20	1	Mayor
6	F	7	11.	Member	Jessica Williams-Hall	5/01/18	4/30/20	1	City Council
			12.	Member	VACANT	5/01/20	4/30/22	1	Mayor
			13.	Member	VACANT	11/1/18	10/31/20	1	City Council
			14.	Member	VACANT	11/1/18	10/31/20	1	Mayor
			15.	Member	VACANT	11/1/18	10/31/20	1	City Council
			16.	Get Engaged	Paula Orrego	9/1/20	8/31/21	1	Mayor
			17.	Member	VACANT	5/01/18	4/30/20	1	City Council
			18.	Member	VACANT	11/1/18	10/31/20	1	Mayor
1	M	2	19.	Member	Daniel Kogita	5/01/18	4/30/20	1	Commission
		1	20.	Member	Kaitlin Skilton	11/1/18	10/31/20	1	Commission
			21.	Member	VACANT	5/01/18	4/30/20	1	Commission

SELF-IDENTIFIED DIVERSITY CHART

	Male (1)	Female (2)	Transgender (3)	NB/ O/ U (4)	Asian (5)	Black/ African American (6)	Hispanic/ Latino (7)	American Indian/ Alaska Native (8)	Other (9)	Caucasian/ Non-Hispanic	Pacific Islander	Middle Eastern	Multiracial
Mayor	1	2		1		2				1			1
Council	1	2						1		2			
Other	1				1								
Total	3	4		1	1	2		1		3			1

Key:

***D** List the corresponding *Diversity Chart* number (1 through 9)
****G** List *gender*, **M**= Male, **F**= Female, **T**= Transgender, **NB=** Non-Binary **O=** Other **U**= Unknown
RD Residential Council District number 1 through 7 or N/A

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Diversity information is self-identified and is voluntary.

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Legislation Text

File #: Appt 01776, **Version:** 1

Reappointment of Anquida Adams as member, Seattle Commission for People with Disabilities, for a term to April 30, 2022.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Anquida Adams*		
Board/Commission Name: *Seattle Commission for People with Disabilities*		**Position Title:** *Member*
☐ **Appointment** ***OR*** ☒ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ Council ☒ Mayor ☐ Other: *Fill in appointing authority*	**Date Appointed:**	**Term of Position: *** 5/1/2020 **to** 4/30/2022 ☐ *Serving remaining term of a vacant position*
Residential Neighborhood: *Capitol Hill*	**Zip Code:** *98102*	**Contact Phone No.*:***

Background:

For the past two years, Anquida has been serving as a Commissioner on the Seattle Commission for People with disAbilities and has been chair of the Inclusions Development and Outreach Committee. She is a genuine, authentic, empathic, intuitive, solutions oriented, progressive, practitioner who helps navigate Individuals and Corporations through times of personal & professional crisis by focusing on our core foundation of: mental self- investigation, emotional intelligence, conversational intelligence, and physical wellness. As a seasoned expert in her field with several years in education and personal hands experience behind her, she knows what truly drives self-awareness, confidence, trust, communication intelligence that will promote outcome returns in more productive teams, better managers, confident direct reports towards management, and balanced work place. Her passion for personal & professional empowerment ignites her current career path as the CEO and Founder of A.L.A. Consulting Firm.

Anquida earned a Bachelor of Arts in Sociology with minors in Gender Studies and Leadership Skills Mississippi State University. Also, Lean Six Sigma Certified with Green Belt from UW Tacoma.

Authorizing Signature (original signature): Jenny A. Durkan	**Appointing Signatory:** *Jenny A. Durkan* *Mayor of Seattle*

**Term begin and end date is fixed and tied to the position and not the appointment date.*

A N Q U I D A A D A M S

STATEMENT

I am seeking to be reappointed as the Mayor appointed Commissioner for People with Disabilities. I successfully apply data-driven decision through Lean Six Sigma techniques to uphold company standards. I work best in professional environments rich in cultural appreciation through both business and education.

SKILL SET

- Bachelors Degree, 4+ years of HR experience, strong leadership and professional team etiquette, on-boarding expertise and influential positive character with a variety of face-to-face business management experience.
- In-depth knowledge of Microsoft Office software including Word, Excel, Outlook, PowerPoint, and SharePoint in addition to communication platforms First Class and Green Light.
- Pro-actively organized, attentive to detail and team oriented goals.

EDUCATION

Minority Business Executive Program
University of Washington, Seattle, WA 2018

Certification, Lean Six Sigma Green Belt
University Of Washington Tacoma, Tacoma, WA 2016

Pursued Masters in Organizational and Leadership Development
Saybook Univerity, Bellevue, WA, 2014 fall session through winter 2015

Pursued Masters in Clinical Mental Health Counseling
South University, Chattanooga, TN, fall 2010 session through winter 2011.

Bachelor of Arts in Sociology, Minors in Gender Studies and Leadership Skills
Mississippi State University, Starkville, MS May 2010

Associate of the Arts, Elementary Education
Colin Community College, Wesson, MS December 2007

Emotional Intelligence Cognitive Training, Oakwood University, Huntsville, AL September 2003
Multi-Cultural Training, University of Huntsville, Huntsville, AL September 2005

**Term begin and end date is fixed and tied to the position and not the appointment date.*

EXPERIENCE

CEO/Founder of A.L.A. Event Planning and Management, WA January 2017-Present

Anquida and direct team are responsible for provide our clientele of organizations (professionals/corporations/government/non-profits) a memorable event during every stage from the event planning to the day of managing with effective transitions and process. Whether it is our signature career fair (Career Fair Pros), organizational private events, and small to midsize events:one--day event, 3-day event, or one-week event.

- Work collaboratively with HR/Departmental team (directors, recruiters, sales managers, event coordinators), to create a memorable event for organizations private events, small to midsize events.
- Recruit Organizations as vendors for our signature Career and Resource Fair.
- Exclusively work with your team to effectively designed private recruiting events as part of your overall talent acquisition strategy.

CEO/ Founder of A.L.A. Consulting Firm, Seattle, WA August 2016-Present

Anquida is the main practitioner with expertise In seeing, developing, and Implementing Systems. Whether it's a human system or organizational system

Our direct team and I, are responsible for creating current effective resources and tools for organized transitional flow within and between systems, which create a learning environment for Organizations (Corporation/Government/ Non-Profits), Diversity, Equity & Inclusion, Business Startups, Entrepreneurs, and Individuals to explore a Holistic/Human-Centered approach to developing skills of creating a higher awareness of Identity intelligence ™ and other internal/external environmental stimulus to address next-generation individual and organizational challenges.

- Work collaboratively with cross-functional teams
- Contribute to strategic direction of the company through direct involvement in formation and evolution of the technical strategy.
- Ability to communicate complex ideas clearly and simply.
- Natural inclination to explore, prototype, and learn.
- Interact with a range of external audiences to listen/learn as well as to evangelize/influence, increase Organizations thought leadership, credibility, and elicit adoption of organizations offers.
- Leadership Skills: Create clarity and alignment. Find and shape brilliance. Boldly raise the bar.
- Comfortable and effective engaging internal audiences and external audiences as a strategic listener and advisor. Coach/developer who is hands on and collaborative.
- Empathetic and approachable with thoughtful, convicted positions and a clear bias toward customer needs and customer success.

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Payroll Analysis/ Departmental Administrator /Starbucks Coffee Company, WA September 2015- December 2015

- Point person for reissues of Partners pay checks.
- Processed validations of all of payroll analysis reissues checks daily.
- Created daily labels for FedEx and PR.
- Sealed and delivered checks to drop off point for mailing Partners reissued checks.
- Knowledgeable of SAP and Roast System.
- Trained new incoming contingent works on validations and reissues.
- Provides assistance for data entry for claims department.

Junior Recruiter/ On Boarding Lead / Swissport USA, Seattle, WA April 2015 – August 2015

- Manages the hiring and training processes while providing an outstanding professional team experience.
- Works closely with career development managers and team members.
- Provides assistance to new hires and sources solutions for immigrant on-boarding.
- Simplifies and streamlines onboarding process to improve efficiencies and reduce risk.
- Strategic management of new training delivery methods to leverage company growth and development.
- Resources scheduling and lead-time management.
- Creates onboarding playbook, spanning pre-hire engagement.
- Collaborates closely with peers in Customer Success and Customer Support.
- Attended local Career Fair Events as a vender to Recruit future candidates.
- Created a new culture for Diversity and Inclusion on all levels of open positions in cleaning, ramp, and ticket counter.

Event Manager / Choice Career Fair, Seattle, WA March 2014 – Present

- Manages 25 vendor exhibits.
- Registers paperwork, career evaluation and categorization.
- Sources opportunities for over 500 job seekers and matches clientele to career fair participants.
- Provides team leadership to the Choice Career Fair event platform.
- Implement emotional intelligences during the following tasks: managing all three direct reports, decelerating and creating solutions frustrated job seekers /vendors.

**Term begin and end date is fixed and tied to the position and not the appointment date.*

HR Talent and Development Administer / Coordinator / employed in other departments in the in-house Temp Pool at Alaska Airlines, SeaTac, WA May 2014- July 2016

- Provides the department proficiency in Microsoft Office applications (i.e. - PowerPoint, Word, and Excel) daily.
- Gains efficiency with the company email First Class and familiarized with Green Light.
- Exhibits character development related to team-oriented leadership skills.
- Manages project assignments brought to completion successfully with little supervision.
- Builds customer service skills and knowledge of how to deliver quality team to customer interactions including excellent experience in professional written and verbal communication skills.
- Resources and creates training information of pre-work for class participants, manages class catering and registration of AA training.
- Provides services of secretarial / administrative support duties for the Talent and Development Manager and Specialist's.
- Implemented Emotional Intelligence skills during everyday tasks as the coordinator in the following areas: planning, scheduling, on boarding training.

Administrative Support, AppleOne, Seattle, WA September - December 2015

- Enters, analyzes, and interprets business data for clientele including Fare Start, Port of Seattle, Sound Transit, and Puget Sound Blood Center, Starbucks Corporate.
- Delivers maintenance of professional relationships to internal departments or agencies.
- Provides personal service and secretarial, administrative, coordinator, and or payroll, support duties.
- Utilizes proper email and phone etiquette while communicating with clients and current employees.
- Prepares documents, spreadsheet, and report using MS Words and Excel.

Personal Assistant to Manager and Onsite Apartment Manager Old Town Realty, Port Orchard, WA November 2013 - May 2014

- Provides tenants personal service with any malfunction of their apartment.
- Conducts walk through upon arrival and departure of tenants.
- Assists with repairs and cleaning of apartment building.
- De-escalates any confrontation on the premises.
- Administrates organizational strategy to Management of Old Town Realty.

**Term begin and end date is fixed and tied to the position and not the appointment date.*

VOLUNTEER EXPERIENCE

Mayor appointed Commissioner, Seattle Commission for People with Disabilities Office of Civil Rights, May 2018 to Present.

- Adviser to the Mayor, City Council, and City departments about issues of importance to people with disabilities, recommends policies, practices, and legislation to the City in matters affecting the concerns of people with disabilities, and encourages understanding among people with various disabilities as well as between people disabilities and larger Seattle community.

Chair of Inclusion, Development, and Outreach, Seattle Commission for People with Disabilities, March 2019 to present

- Bridging the Gaps between the disability communities, allies, organizations, institutions and entertainment with a human-centered approach.

- Providing awareness, concentration, and inclusiveness within the workforce, institutions, and entertainment sectors for individuals with disabilities. To create a pathway for initiating advocacy and implementing change in order to dismantle fears, lack of knowledge and interactions with the disability community.

- In addition to awareness, concentrations and inclusiveness, our committee will continue to be responsive to issues identified by the disabilities community in the areas of Accessibility, Economic and Educational Opportunities, Equitable Development, and Building a strong Constituent base to create community and belonging.

Union Women's Shelter, Southlake Union, Seattle Washington October 2019 to present

- Setup room for women stay,
- Connect with women during their stay before bed during dinner and socialize time,
- setup for breakfast, and
- Morning Cleanup.

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Seattle Commission for People with Disabilities
October 2020

21 Members: Pursuant to *SMC 3.14.920,* all members subject to City Council confirmation, *2*-year terms:

- *8* City Council-appointed
- *9* Mayor-appointed (includes 1 Get-engaged Mayor position)
- *4* Other Appointing Authority-appointed (specify): Commission-appointed

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
9	F	3	1.	Member	Hannah Wilson	5/01/19	4/30/21	1	Mayor
			2.	Member	VACANT	5/01/19	4/30/21		City Council
6	M	3	3.	Member	Eric L. Scheir	5/01/19	4/30/21	2	Mayor
6	M	6	4.	Member	Jayson Morris	5/01/19	4/30/21	2	City Council
			5.	Member	VACANT	11/1/19	10/31/21		Mayor
			6.	Member	VACANT	11/1/19	10/31/21		City Council
2	NB	5	7.	Member	ChrisTiana ObeySumner	11/1/19	10/31/21	3	Mayor
			8.	Member	VACANT	11/1/19	10/31/21		Commission
4	F		9.	Member	Kristina Sawyckyj	5/01/20	4/30/22	2	City Council
2	F	3	10.	Member	Anquida Adams	5/01/20	4/30/22	2	Mayor
6	F	7	11.	Member	Jessica Williams-Hall	5/01/20	4/30/22	2	City Council
			12.	Member	VACANT	5/01/20	4/30/22		Mayor
			13.	Member	VACANT	11/1/20	10/31/22		City Council
			14.	Member	VACANT	11/1/20	10/31/22		Mayor
			15.	Member	VACANT	11/1/20	10/31/22		City Council
			16.	Get Engaged	Paula Orrego	9/1/20	8/31/21	1	Mayor
			17.	Member	VACANT	5/01/20	4/30/22		City Council
			18.	Member	VACANT	11/1/20	10/31/22		Mayor
1	M	2	19.	Member	Daniel Kogita	5/01/20	4/30/22	2	Commission
			20.	Member	VACANT	11/1/20	10/31/22		Commission
		1	21.	Member	Kaitlin Skilton	11/1/20	10/31/22	1	Commission

SELF-IDENTIFIED DIVERSITY CHART

	Male (1)	Female (2)	Transgender (3)	NB/ O/ U (4)	Asian (5)	Black/ African American (6)	Hispanic/ Latino (7)	American Indian/ Alaska Native (8)	Other (9)	Caucasian/ Non-Hispanic	Pacific Islander	Middle Eastern	Multiracial
Mayor	1	2		1		2				1			1
Council	1	2						1		2			
Other	1				1								
Total	3	4		1	1	2		1		3			1

Key:

***D** List the corresponding *Diversity Chart* number (1 through 9)
****G** List *gender*, **M**= Male, **F**= Female, **T**= Transgender, **NB=** Non-Binary **O=** Other **U**= Unknown
RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01777, **Version:** 1

Reappointment of Daniel Kogita as member, Seattle Commission for People with Disabilities, for a term to April 30, 2022.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Daniel Kogita*		
Board/Commission Name: *Seattle Commission for People with Disabilities*		**Position Title:** *Member*
☐ **Appointment** ***OR*** ☒ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ Council ☐ Mayor ☒ Other: Commission	**Date Appointed:**	**Term of Position: *** 5/1/2020 **to** 4/30/2022
Residential Neighborhood: Beacon Hill	**Zip Code:** 98108	**Contact Phone No.*:***

Background:

Daniel "King Khazm" Kogita is a multifaceted artist and community organizer who has become a prominent figure in the Hip-Hop community within Seattle and around the world. His work to unify and empower the community is demonstrated through over 20 years of art and community service. For the past two years, Khazm has been serving as a Commissioner on the Seattle Commission for People with disAbilities and looks forward to his continued work.

He is the Executive Director of 206 Universal, a non-profit community organization that empowers youth and families through urban arts and culture. He is also on the board of directors of The Here and Now Project, a non-profit organization that connects and empowers the paralysis community in the Pacific Northwest.

As a performer and educator, he has participated in countless events, workshops, panels and assemblies, at places such as the University of Washington, University of Costa Rica, Willamette University, Portland State University, Galpao Aplauso (Brazil), and Festival de la Juventud (Guatemala).

Khazm has received recognitions from dignitaries such as Estella Ortega of El Centro de la Raza, former Seattle Mayor Nickels, and Washington State Governor Inslee. His influence as a cultural ambassador has helped shape Hip Hop organizing circles and has supported the development of other arts organizations in Oregon, Malta, UAE, Malaysia, and Costa Rica where the movement to preserve and elevate Hip Hop culture continues.

Authorizing Signature (original signature):	**Appointing Signatory:** *Eric Scheir,* *Disability Co-chair on behalf of the Commission*

**Term begin and end date is fixed and tied to the position and not appointment date.* *Last revised July 19, 2016*

EXPERIENCE

EXECUTIVE DIRECTOR — 2004 - PRESENT
206 **UNIVERSAL**

Seattle's premier Hip Hop organization hosting hundreds of events, using arts and culture as outlets for engagement, self-empowerment and unity.

FOUNDER/OWNER — 1996 - PRESENT
MADK PRODUCTIONS

Record label and multimedia company that has released artists such as Khingz, Specs Wizard, Gabriel Teodros, Suntonio Bandanaz, DJ Scene and more.

MEDIA PRODUCER — 1999 - PRESENT
HIP HOP 101 TV & ZULU RADIO KBCS 91 .3 FM

Founded and produced Seattle's acclaimed Hip Hop outlets, Hip Hop 101 TV on SCAN ch 29 from 1999-2009 and Zulu Radio on KBCS 91 .3 FM from 2005-current.

DANIEL KOGITA

Also known as King Khazm has been a forma- tive force in the Seattle Hip Hop scene for years. and his mo- mentum as an artist emcee. producer. educator and com- munity leader has only grown since he founded MAD Krew in 95

SKILLS

Began working professionally in 1994. Work has been exhibited in places such as Experience Music Project Museum, Consolidated Art Works, and Pratt Fine Arts Center. — ARTIST/DESIGNER

Has performed works in Washington, Oregon, California, Arizona, New York, Florida, Ohio, Hawaii, Canada, Malaysia, Guatemala and more. — MC/PRODUCER

Lectured at University of Washington, SCCC, Portland State University, Williamette University, Shoreline CC, KC Juvenile Detention, Children's Hospital , and University of Costa Rica . — EDUCATOR

RECOGNITIONS

ATCON AWARD — 2017
RIO DE JANEIRO, BRAZIL
Received ACTON award from Embaixada Hip-Hop

HISTORIC PRESERVATION AWARD — 2017
Received a Historic Preservation Stewarship Award from the Washington State Department of Archaelogy and Historic Preservation.

RICHARD H DRIEHAUS FOUNDATION NATIONAL PRESERVATION AWARD — 2017
Received a Richard H Driehaus Foundation National Preservation award from the National Trust for Historic Preservation.

RECOGNITIONS

HIP HOP HISTORY MONTH 2015
WASHINGTON STATE
Received award from Governor Inslee honoring November as Hip Hop History Month Proclamation in Washington State.

POR EL DERECHO A LA VIDA 2014
Received a "Por el Derecho a la Vida" recognition from Glass-wing International, Guatemala

LEGACY AWARD 2014
Received the 2014 Maestas Legacy Award from El Centro de la Raza

HIP HOP HISTORY MONTH 2012
CITY OF LACEY
Received award from Lacey Mayor Ryder honoring November as Hip Hop History Month Pro clamation .

HIP HOP HISTORY MONTH 2012
CITY OF TACOMA
Received award from Tacoma Mayor Strickland honoring November as Hip Hop History Month Proclamation.

HIP HOP HISTORY MONTH 2012
CITY OF OLYMPIA
Received award from Olympia Mayor Buxbaum honoring November as Hip Hop History Month Proclamation.

HIP HOP HISTORY MONTH 2012
CITY OF BREMERTON
Received award from Bremerton Mayor Lent honoring November as Hip Hop History Month Proclamation.

HIP HOP HISTORY MONTH 2010
CITY OF SEATTLE
Received award from Seattle Mayor McGinn honoring November as Hip Hop History Month Proclamation.

MASSIVE MON KEES AWARD 2012
Received a Massive Monkees Appreciation Award .

MIGHTY 4 2009
Received a Mighty 4 Appreciation Award .

COMMUNITY LEADERSHIP AWARD 2006
Received award from former Seattle Mayor Nickels for excellence in community leadership.

TROOPER AWARD 1999
Received a Trooper Award from Bboy Masters Pro/Am

Seattle Commission for People with Disabilities
October 2020

21 Members: Pursuant to *SMC 3.14.920,* all members subject to City Council confirmation, *2*-year terms:

- *8* City Council-appointed
- *9* Mayor-appointed (includes 1 Get-engaged Mayor position)
- *4* Other Appointing Authority-appointed (specify): Commission-appointed

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
9	F	3	1.	Member	Hannah Wilson	5/01/19	4/30/21	1	Mayor
			2.	Member	VACANT	5/01/19	4/30/21		City Council
6	M	3	3.	Member	Eric L. Scheir	5/01/19	4/30/21	2	Mayor
6	M	6	4.	Member	Jayson Morris	5/01/19	4/30/21	2	City Council
			5.	Member	VACANT	11/1/19	10/31/21		Mayor
			6.	Member	VACANT	11/1/19	10/31/21		City Council
2	NB	5	7.	Member	ChrisTiana ObeySumner	11/1/19	10/31/21	3	Mayor
			8.	Member	VACANT	11/1/19	10/31/21		Commission
4	F		9.	Member	Kristina Sawyckyj	5/01/20	4/30/22	2	City Council
2	F	3	10.	Member	Anquida Adams	5/01/20	4/30/22	2	Mayor
6	F	7	11.	Member	Jessica Williams-Hall	5/01/20	4/30/22	2	City Council
			12.	Member	VACANT	5/01/20	4/30/22		Mayor
			13.	Member	VACANT	11/1/20	10/31/22		City Council
			14.	Member	VACANT	11/1/20	10/31/22		Mayor
			15.	Member	VACANT	11/1/20	10/31/22		City Council
			16.	Get Engaged	Paula Orrego	9/1/20	8/31/21	1	Mayor
			17.	Member	VACANT	5/01/20	4/30/22		City Council
			18.	Member	VACANT	11/1/20	10/31/22		Mayor
1	M	2	19.	Member	Daniel Kogita	5/01/20	4/30/22	2	Commission
			20.	Member	VACANT	11/1/20	10/31/22		Commission
		1	21.	Member	Kaitlin Skilton	11/1/20	10/31/22	1	Commission

SELF-IDENTIFIED DIVERSITY CHART

	Male (1)	Female (2)	Transgender (3)	NB/ O/ U (4)	Asian (5)	Black/ African American (6)	Hispanic/ Latino (7)	American Indian/ Alaska Native (8)	Other (9)	Caucasian/ Non-Hispanic	Pacific Islander	Middle Eastern	Multiracial
Mayor	1	2		1		2				1			1
Council	1	2						1		2			
Other	1				1								
Total	3	4		1	1	2		1		3			1

Key:

***D** List the corresponding *Diversity Chart* number (1 through 9)
****G** List *gender*, **M**= Male, **F**= Female, **T**= Transgender, **NB=** Non-Binary **O=** Other **U**= Unknown
RD Residential Council District number 1 through 7 or N/A
Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01778, **Version:** 1

Reappointment of Kaitlin Skilton as member, Seattle Commission for People with Disabilities, for a term to October 31, 2022.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Kaitlin Skilton*		
Board/Commission Name: *Seattle Commission for People with Disabilities*		**Position Title:** *Commission Member*
☐ **Appointment** ***OR*** ☒ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ Council ☐ Mayor ☒ Other: *Commission*	**Date Appointed:** *mm/dd/yy*.	**Term of Position: *** 11/1/2020 **to** 10/31/2022 ☒ *Serving remaining term of a vacant position*
Residential Neighborhood: *Delridge*	**Zip Code:** *98106*	**Contact Phone No.*:***
Background: *Kaitlin Skilton was born with Spina bifida myelomeningocele as well as other underlined Disabilities. Her current job is with the Seattle Youth Employment Program and is a freelance photographer. She was recently crowned the current titleholder for Ms. Wheelchair Washington-America and has worked with RAW Artists Seattle in numerous showcases. She is hopefull in extendending her title and looks forward to working with the Seattle Commission for People with disAbilities by establishing a relationship and invites opportunity for collaboration.*		
Authorizing Signature (original signature):	**Appointing Signatory:** *Eric Scheir,* *Disability Co-chair on behalf of the Commission*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Kaitlin Skilton

Education:
Careerlink High School
Seattle, WA 98106

South Seattle College
Seattle, WA 98106

Work Experience:

In Home Nanny
Cindy Sandino chang

Duties: assistance with bathroom needs, Children's laundry when needed, meal prep, arranging indoor/outdoor activities, occasionally walking to the park, Help with homework, Light housekeeping

Volunteer experience:

Volunteer Teaching Assistant
Bayview Learning Center

Duties: monitoring activities, assist children when needed, hanging/laminating artwork, reading to/with children, guiding activities while the teacher is otherwise occupied, acts as an extra eye for teachers so that they may complete paperwork

Activities:

Seattle adaptive sports
Office mom's and dad's

Seattle Commission for People with Disabilities
October 2020

21 Members: Pursuant to *SMC 3.14.920,* all members subject to City Council confirmation, *2*-year terms:

- *8* City Council-appointed
- *9* Mayor-appointed (includes 1 Get-engaged Mayor position)
- *4* Other Appointing Authority-appointed (specify): Commission-appointed

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
9	F	3	1.	Member	Hannah Wilson	5/01/19	4/30/21	1	Mayor
			2.	Member	VACANT	5/01/19	4/30/21		City Council
6	M	3	3.	Member	Eric L. Scheir	5/01/19	4/30/21	2	Mayor
6	M	6	4.	Member	Jayson Morris	5/01/19	4/30/21	2	City Council
			5.	Member	VACANT	11/1/19	10/31/21		Mayor
			6.	Member	VACANT	11/1/19	10/31/21		City Council
2	NB	5	7.	Member	ChrisTiana ObeySumner	11/1/19	10/31/21	3	Mayor
			8.	Member	VACANT	11/1/19	10/31/21		Commission
4	F		9.	Member	Kristina Sawyckyj	5/01/20	4/30/22	2	City Council
2	F	3	10.	Member	Anquida Adams	5/01/20	4/30/22	2	Mayor
6	F	7	11.	Member	Jessica Williams-Hall	5/01/20	4/30/22	2	City Council
			12.	Member	VACANT	5/01/20	4/30/22		Mayor
			13.	Member	VACANT	11/1/20	10/31/22		City Council
			14.	Member	VACANT	11/1/20	10/31/22		Mayor
			15.	Member	VACANT	11/1/20	10/31/22		City Council
			16.	Get Engaged	Paula Orrego	9/1/20	8/31/21	1	Mayor
			17.	Member	VACANT	5/01/20	4/30/22		City Council
			18.	Member	VACANT	11/1/20	10/31/22		Mayor
1	M	2	19.	Member	Daniel Kogita	5/01/20	4/30/22	2	Commission
			20.	Member	VACANT	11/1/20	10/31/22		Commission
		1	21.	Member	Kaitlin Skilton	11/1/20	10/31/22	1	Commission

SELF-IDENTIFIED DIVERSITY CHART

	Male (1)	Female (2)	Transgender (3)	NB/ O/ U (4)	Asian (5)	Black/ African American (6)	Hispanic/ Latino (7)	American Indian/ Alaska Native (8)	Other (9)	Caucasian/ Non-Hispanic	Pacific Islander	Middle Eastern	Multiracial
Mayor	1	2		1		2				1			1
Council	1	2						1		2			
Other	1				1								
Total	3	4		1	1	2		1		3			1

Key:

***D** List the corresponding *Diversity Chart* number (1 through 9)
****G** List *gender*, **M**= Male, **F**= Female, **T**= Transgender, **NB=** Non-Binary **O=** Other **U**= Unknown
RD Residential Council District number 1 through 7 or N/A
Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01732, **Version:** 1

Reappointment of Paula L. Houston as member, Seattle Housing Authority Board, for a term to March 20, 2024.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: Dr. Paula Houston		
Board/Commission Name: Seattle Housing Authority Board of Commissioners		**Position Title:** *Board Commissioner*
☐ **Appointment** ***OR*** ☒ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ Council ☒ **X** Mayor ☐ Other: *Fill in appointing authority*	**Date Appointed:** 9/21/2020	**Term of Position: *** 3/21/2020 **to** 3/20/2024 ☐ *Serving remaining term of a vacant position*
Residential Neighborhood: Rainier Beach	**Zip Code:** **98178**	**Contact Phone No.*:*** [redacted]
Background: Dr. Paula Houston has over 20 years of leadership experience in the non-profit, government health and human services field and has served on the SHA Board since 2016. During her tenure she has shown a keen interest in Seattle Housing Authority serving more low-income people and has taken on a leadership role, currently serving as Vice President of the Board of Commissioners. She is currently the Director of Healthcare Equity in the Office of the Chief Medical Officer at University of Washington Medicine. Prior to this position, Dr. Houston served as the CEO of Sound Generations, where she lead a $16.4 million agency of 220 staff to provide support to approximately 70,000 seniors and families throughout King County. In conjunction with her ample experience working with large agencies & budgets, and her broad range of past experiences, Dr. Houston will continue to bring a bigpicture, strategic perspective to the SHA Board.		
Authorizing Signature (original signature): Jenny A. Durkan	**Appointing Signatory:** *Jenny A. Durkan* *Mayor of Seattle*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

BIO

Paula L. Houston, Ed.D.

Dr. Paula L. Houston is currently the CEO of Sound Generations in Seattle, Washington, the largest non-profit in the state providing services and programs to seniors and those who care for them. Previously to assuming the top leadership role at Senior Services, she spent eight years as the Executive Director for the Meredith Mathews East Madison YMCA, a vibrant urban branch of the YMCA of Greater Seattle and was the Association Director of Public Affairs. Her other professional experience is in public health and community health administration. She also has a background in the fitness industry.

Immediately prior to her tenure with the YMCA, Dr. Houston was the Clinic Manager at Carolyn Downs Family Medical Center, part of the community clinic system in Seattle. She spent seven years with Public Health, Seattle & King County as interim Division Manager for the Division of Alcoholism and Substance Abuse Services and District Administrator for the Central Region Special Health Services. Additionally, she was business entrepreneur and owned her own fitness and wellness center for two years.

Dr. Houston is an active community leader, particularly in Central and Southeast Seattle. She has a passion for supporting programs that focus on improving quality of life for a lifetime, in the effort to strengthen the overall health and well-being of the community. She is currently a member of Seattle Rotary #4, where she has held an officer position, sits on the board of the Alzheimer's Association and is a member of the Seattle Art Museum's Education and Community Engagement Committee. She has also been a member of numerous other non-profit boards and served two terms on the Seattle Women's Commission.

Dr. Houston's zeal for helping communities attain and maintain optimal health and well-being stems from her personal commitment to physical fitness and the spiritual and emotional strength that being active and fit creates. She fulfills this passion by being a competitive powerlifter. Dr. Houston is an eleven time national and five time world champion powerlifter. In addition to being an elite athlete within powerlifting, she is a state and national official, past Washington State Chair of USA Powerlifting, and has served on national USA Powerlifting committees. She has also been a volunteer for Special Olympics powerlifting for over 15 years, coordinating their summer games event. In 2006 and again in 2010, Dr. Houston was Washington's state's powerlifting Athlete of the Year. She is a member of the Washington State Powerlifting Hall of Fame and in 2012 was inducted in the USA Powerlifting National Hall of Fame.

Finally, Dr. Houston has a B.S. from Syracuse University, a master's degree in Health Administration from the University of Washington and earned her Doctorate in Educational Leadership from Seattle University in 2014.

Updated 18-May-16

Seattle Housing Authority Board

7 Members: Pursuant to *Resolution 29821 and RCW 35.82, all* members subject to City Council confirmation, *4*-year terms:

- *#* City Council-appointed
- *7* Mayor-appointed
- *#* Other Appointing Authority-appointed (specify):

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
2	F	N/A	1.	Resident	Twyla Minor	10/01/18	9/30/22	1	Mayor
2	M	N/A	2.	Commissioner	Gerald Smiley	3/20/19	03/19/23	2	Mayor
6	M	N/A	3.	Commissioner, Chair	Paul Purcell	12/02/18	12/01/22	2	Mayor
2	M	N/A	4.	Commissioner	Robert Crutchfield	12/01/18	12/01/22	2	Mayor
2	F	N/A	5.	Commissioner, Vice-Chair	Paula L. Houston	3/21/20	3/20/24	2	Mayor
3	M	N/A	6.	Resident	Michael Diaz	3/21/19	3/20/23	1	Mayor
6	F	N/A	7.	Commissioner	Deborah Canavan Thiele	3/21/17	3/20/21	1	Mayor

SELF-IDENTIFIED DIVERSITY CHART

	(1) Male	(2) Female	(3) Transgender	(4) NB/ O/ U	(5) Asian	(6) Black/ African American	(7) Hispanic/ Latino	(8) American Indian/ Alaska Native	(9) Other	Caucasian/ Non-Hispanic	Pacific Islander	Middle Eastern	Multiracial
Mayor	4	3				4	1			2			
Council													
Other													
Total	4	3				4	1			2			

Key:

***D** List the corresponding *Diversity Chart* number (1 through 9)
****G** List *gender*, **M**= Male, **F**= Female, **T**= Transgender, **NB=** Non-Binary **O=** Other **U**= Unknown
RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01733, **Version:** 1

Reappointment of Paul Breckenridge as member, Community Roots Housing Public Development Authority Governing Council, for a term to March 31, 2023.

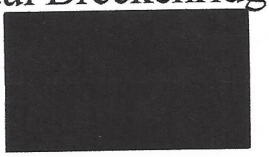
The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Paul Breckenridge*		
Board/Commission Name: Community Roots Housing Public Development Authority		**Position Title:** *Member*
☐ **Appointment** ***OR*** ☒ **Reappointment**	**City Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ City Council ☐ Mayor ☒ Other: *Governing Council*	**Term of Position: *** 4/1/2020 **to** 3/31/2023 ☐ *Serving remaining term of a vacant position*	
Residential Neighborhood: *Capitol Hill*	**Zip Code:** *98122*	**Contact Phone No.:** [redacted]
Background: *Paul founded Breckenridge Consulting Services (BCS) in 2007 to help bridge the gap between the organizations that provide tax credit capital and the developers and service agencies that utilize that capital. Prior to starting BCS, Paul served as the Western Region Director for Enterprise Community Investment's Structured Finance Department. At Enterprise, Paul managed over $160 million in NMTC and Low Income Housing Tax Credit investment throughout the western US. Paul previously worked as a developer at the Low Income Housing Institute. Paul is a Returned Peace Corps Volunteer, having served in Jamaica from 1997-1999. Paul holds an MBA from the University of Washington, and a BS from Willamette University.*		
Authorizing Signature (original signature): **Date Signed (appointed):** April 13, 2020	**Appointing Signatory:** *Shalimar Gonzales* *Capitol Hill Housing Governing Council, Board Chair*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Paul Breckenridge



EXPERIENCE

2007- **BRECKENRIDGE CONSULTING SERVICES, INC.** Seattle, WA
President

BCS works with a range of clients to develop and execute New Markets Tax Credit (NMTC) and Historic Tax Credit financing strategies. BCS clients include real estate developers, nonprofit organizations expanding into new facilities, businesses seeking capital financing, Native American tribes and community development entities (CDEs).

- BCS has closed over $560 million in 39 NMTC and Historic Tax Credit transactions around the country.
- BCS has prepared successful NMTC applications on behalf of multiple CDE clients resulting in $180 million of NMTC allocation.
- Since 2007, BCS has been retained by Local Initiatives Support Corporation's NMTC group to assist in NMTC deployment and strategic planning. LISC is one of the largest recipients of NMTC allocation in the country.

2003-2007 **ENTERPRISE COMMUNITY INVESTMENT** Seattle, WA
Director – Western Region – Structured Finance Group

I originated and structured New Markets Tax Credit, Low Income Housing Tax Credit, and mezzanine debt transactions in underserved communities throughout the western United States. My work involved identifying investment opportunities, preparing and analyzing advanced financial models, negotiating investment terms with developers, managing real estate risk, and coordinating a legal team in transaction closings. At Enterprise, I managed the investment of over $114 million of LIHTC equity and $50 million of NMTC allocation.

1999-2001 **LOW INCOME HOUSING INSTITUTE** Seattle, WA
Housing Developer

LIHI is a nonprofit low-income housing developer based in Seattle, Washington. At LIHI, I coordinated the acquisition and financing for multifamily rental housing projects serving homeless and low-income households.

1997-1999 **UNITED STATES PEACE CORPS** St. Elizabeth, Jamaica
Volunteer

As a Peace Corps Volunteer in rural Jamaica, I worked on a variety of projects ranging from the promotion of sustainable farming practices to coordinating youth summer camps.

EDUCATION

June 2003 **UNIVERSITY OF WASHINGTON** Seattle, WA
Master of Business Administration

May 1997 **WILLAMETTE UNIVERSITY** Salem, OR
Bachelor of Science in Environmental Science

Community Roots Housing Public Development Authority

DECEMBER 2020

No less than 11 members and no more than 15 members: Pursuant to RCW 35.21.730 and Seattle Municipal Code 3.110, *all* members subject to City Council confirmation, *3*-year terms:

- *3* Mayor-appointed
- *8 to 12* Other Appointing Authority-appointed (specify): CHH Governing Council

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
2	M	5	1.	Member	**George Staggers**	**4/1/20**	**3/31/23**	**2**	Governing Council
3	M	3	3.	Member	Frank F Alvarado III	4/1/17	3/31/21	**4**	Governing Council
	F		3.	Member	**Sarah Cubillos**	**4/1/20**	**3/31/23**	1	Governing Council
2	F	4	4.	Member	**M. Michelle Purnell-Hepburn**	**4/1/20**	**3/31/23**	1	Governing Council
6	M	3	5.	Member	**Paul Breckenridge**	**4/1/20**	**3/31/23**	2	Governing Council
6	F	3	6.	Member	**Jill Cronauer**	**4/1/20**	**3/31/23**	**2**	Governing Council
6	F	3	7.	Member	Rachel Ben-Shmuel	4/1/19	3/31/22	3	Governing Council
2	F	N/A	8.	Member	**Michelle Morlan**	**4/1/20**	**3/31/23**	**1**	Governing Council
6	M	3	9.	Member	**Bob Fikso**	**4/1/20**	**3/31/23**	**2**	Governing Council
2	F	3	10.	Member	Barbara Nabors-Glass	4/1/18	3/31/21	2	Governing Council
6	M	3	11.	Member	Drew Porter	4/1/18	3/31/21	3	Governing Council
6	M	7	12.	Member	Chasten Fulbright	4/1/27	3/31/20	1	Mayor
6	M	3	13.	Member	Eric Snow	4/1/18	3/31/21	2	Mayor
9	F	7	14.	Member	Shalimar Gonzales	4/1/17	3/31/20	1	Mayor
4	M	3	15.	Member	**Derrick Belgarde**	**4/1/19**	**3/31/22**	2	Governing Council

SELF-IDENTIFIED DIVERSITY CHART

	Men	Women	Transgender	Unknown	Asian (1)	Black/ African American (2)	Hispanic/ Latino (3)	American Indian/ Alaska Native (4)	Other (Specification Optional) (5)	Caucasian/ Non-Hispanic (6)	Pacific Islander (7)	Middle Eastern (8)	Multiracial (9)
Mayor	2	1								2			1
Council	6	6				4	1	1		5			
Other													
Total	8	7				4	1	1		7			1

Key: ***D** List the corresponding *Diversity Chart* number (1 through 9) – Diversity information is self-identified & voluntary
****G** List *gender*, **M** = Male, **F**= Female, **T**= Transgender, **U**= Unknown
RD Residential Council District number 1 through 7 or N/A

Legislation Text

File #: Appt 01734, **Version:** 1

Reappointment of Jillian Cronauer as member, Community Roots Housing Public Development Authority Governing Council, for a term to March 31, 2023.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Jillian Cronauer*		
Board/Commission Name: *Community Roots Housing Public Development Authority*		**Position Title:** *Member, Board Secretary*
☐ **Appointment** ***OR*** ☒ **Reappointment**	**City Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ City Council ☐ Mayor ☒ Other: Governing Council	**Term of Position: *** 4/1/2020 **to** 3/31/2023 ☐ *Serving remaining term of a vacant position*	
Residential Neighborhood: *Madison Valley*	**Zip Code:** *98112*	**Contact Phone No.*:*** [redacted]
Background: *Jill Cronauer is the Chief Operating Officer and designated broker for Hunters Capital. She is responsible for property acquisitions, marketing, leasing, public relations and overall business operations. Since joining the Hunters Capital team in 2008, Jill has grown Hunters' managed square feet from 160,000 to nearly 600,000 square feet in Seattle's Capitol Hill and First Hill neighborhoods. Jill is dedicated to Hunters Capital's mission of preserving architectural integrity and Seattle's historic legacy by restoring and refurbishing turn-of-the century buildings and finding creative and innovative retail and office tenants who serve the neighborhood. Also representing Hunters Capital in local community affairs, she served as President and Chairperson of the Capitol Hill Chamber of Commerce.*		
Authorizing Signature (original signature): **Date Signed (appointed):** April 13, 2020	**Appointing Signatory:** *Shalimar Gonzales* *Capitol Hill Housing Governing Council, Board Chair*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

JILLIAN CRONAUER

[redacted]

EXPERIENCE

2008 – PRESENT

COO, HUNTERS CAPITAL, LLC

Responsible for general business operations including residential and commercial property management, residential and commercial leasing, portfolio management.

2005 – 2008

TEACHER, SIERRA HEIGHTS ELEMENTARY

Primary classroom educator at a Title 1 school, 3rd and 4th grade.

EDUCATION

DECEMBER 2004

BACHELOR OF ARTS IN HISTORY, GONZAGA UNIVERSITY

Additional certification in elementary education
Gonzaga-in-Florence, Italy 2002-2003

PROFESSIONAL INVOLVEMENT, AWARDS

- 15TH AVE MERCHANTS ASSOCIATION 2018 – PRESENT, BIA Formation committee
- URBAN LAND INSTITUTE MEMBER 2014-PRESENT, spring conference presenter 2017
- CAPITOL HILL CHAMPIONS COMMITTEE MEMBER 2017-PRESENT
- CAPITOL HILL CHAMBER OF COMMERCE BOARD 2011-2017, Board Chair 2012-2016
- SPIRIT OF THE HILL AWARD RECIPIENT 2017

Community Roots Housing Public Development Authority

DECEMBER 2020

No less than 11 members and no more than 15 members: Pursuant to RCW 35.21.730 and Seattle Municipal Code 3.110, *all* members subject to City Council confirmation, *3*-year terms:

- *3* Mayor-appointed
- *8 to 12* Other Appointing Authority-appointed (specify): CHH Governing Council

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
2	M	5	1.	Member	**George Staggers**	**4/1/20**	**3/31/23**	**2**	Governing Council
3	M	3	3.	Member	Frank F Alvarado III	4/1/17	3/31/21	**4**	Governing Council
	F		3.	Member	**Sarah Cubillos**	**4/1/20**	**3/31/23**	1	Governing Council
2	F	4	4.	Member	**M. Michelle Purnell-Hepburn**	**4/1/20**	**3/31/23**	1	Governing Council
6	M	3	5.	Member	**Paul Breckenridge**	**4/1/20**	**3/31/23**	2	Governing Council
6	F	3	6.	Member	**Jill Cronauer**	**4/1/20**	**3/31/23**	**2**	Governing Council
6	F	3	7.	Member	Rachel Ben-Shmuel	4/1/19	3/31/22	3	Governing Council
2	F	N/A	8.	Member	**Michelle Morlan**	**4/1/20**	**3/31/23**	**1**	Governing Council
6	M	3	9.	Member	**Bob Fikso**	**4/1/20**	**3/31/23**	**2**	Governing Council
2	F	3	10.	Member	Barbara Nabors-Glass	4/1/18	3/31/21	2	Governing Council
6	M	3	11.	Member	Drew Porter	4/1/18	3/31/21	3	Governing Council
6	M	7	12.	Member	Chasten Fulbright	4/1/27	3/31/20	1	Mayor
6	M	3	13.	Member	Eric Snow	4/1/18	3/31/21	2	Mayor
9	F	7	14.	Member	Shalimar Gonzales	4/1/17	3/31/20	1	Mayor
4	M	3	15.	Member	**Derrick Belgarde**	**4/1/19**	**3/31/22**	2	Governing Council

SELF-IDENTIFIED DIVERSITY CHART

	Men	Women	Transgender	Unknown	Asian (1)	Black/ African American (2)	Hispanic/ Latino (3)	American Indian/ Alaska Native (4)	Other (Specification Optional) (5)	Caucasian/ Non-Hispanic (6)	Pacific Islander (7)	Middle Eastern (8)	Multiracial (9)
Mayor	2	1								2			1
Council	6	6				4	1	1		5			
Other													
Total	8	7				4	1	1		7			1

Key: ***D** List the corresponding *Diversity Chart* number (1 through 9) – Diversity information is self-identified & voluntary
****G** List *gender*, **M** = Male, **F**= Female, **T**= Transgender, **U**= Unknown
RD Residential Council District number 1 through 7 or N/A

Legislation Text

File #: Appt 01735, **Version:** 1

Appointment of Sara Cubillos as member, Community Roots Housing Public Development Authority Governing Council, for a term to March 31, 2023.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Sara Cubillos*		
Board/Commission Name: *Community Roots Housing Public Development Authority*		**Position Title:** *Member*
☒ **Appointment** ***OR*** ☐ **Reappointment**	**City Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ City Council ☐ Mayor ☒ Other: *Governing Council*	**Term of Position: *** 4/1/2020 **to** 3/31/2023 ☐ *Serving remaining term of a vacant position*	
Residential Neighborhood: *First Hill*	**Zip Code:** *98122*	**Contact Phone No.*:*** [redacted]
Background: *Sara is a Strategic Advisor for Seattle Public Utilities with their Drainage and Wastewater Planning Division. Her career has focused on bringing a voice to those most affected and traditionally underrepresented into environmental decision making and investments. Before Seattle Public Utilities, she was the Equity & Environment Program Coordinator at Seattle Office of Sustainability & Environment. Sara holds a BA in Public Affairs from Seattle University and a Master of Urban Planning from the University of Washington, specializing in Real Estate and a certificate in Historic Preservation. She has been a Capitol Hill resident for nine years.*		
Authorizing Signature (original signature): **Date Signed (appointed):** April 13, 2020	**Appointing Signatory:** *Shalimar Gonzales* *Capitol Hill Housing Governing Council, Board Chair*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Sara Cubillos

[redacted]

Education

MASTER OF URBAN PLANNING **UNIVERSITY OF WASHINGTON**

Certificate in Historic Preservation | Specialization in Real Estate

BACHELOR OF ARTS IN PUBLIC AFFAIRS **SEATTLE UNIVERSITY**

Specialization in Urban Studies | Member of Public Affairs Honor Society, Pi Alpha Alpha

Experience

SYSTEM PLANNING STRATEGIC ADVISOR
SEATTLE PUBLIC UTILITIES: DRAINAGE & WASTEWATER LINE OF BUSINESS **SEPTEMBER 2018- PRESENT**

Project Manager for the Integrated System Plan: Visioning Process focused on aligning community and Utility priorities to develop multi-benefit infrastructure investments in areas of the city that need them the most.

- Creating an engagement campaign strategy to reach a diverse set of stakeholders where they are, including internal employees, underrepresented communities, local non-profits, and other government agencies
- Managing a $2M Consultant Contract with 1 prime and 4 subconsultants including. scoping, budgeting, and invoicing
- Facilitating workshops on environmental justice and racial equity as a design practice
- Providing expertise to Utility and City-wide initiatives on environmental justice, community development, affordable housing, advancing racial equity goals and analysis on various projects

EQUITY & ENVIRONMENT PROGRAM COORDINATOR
SEATTLE OFFICE OF SUSTAINABILITY & ENVIRONMENT **AUGUST 2015-AUGUST 2018**

Supported the implementation of the Equity & Environment Initiative (EEI), an innovative government approach to centering communities of color and racial justice in the environmental movement. Work included collaborating on strategy development, building trusted partnerships with communities of color, developing contracts for community partners, coaching community partners on collaboration with the City; and coaching government colleagues on racial equity and equitable inclusion of communities of color, immigrants, and refugees in programs and policies.

- Project Manager of Seattle's Environmental Equity Assessment, working in partnership with city staff and community
- Contributed to the creation of first in the nation Equity & Environment Agenda (EE Agenda)
- Contracted with and coached 10 community-based organizations to support their work to implement a multi-ethnic, multi-lingual community engagement plan for underrepresented communities, reaching over 1,000 Seattle residents
- Facilitated and managed a process with the City's Environmental Justice Committee to create and adopt Principles of Public Space for Communities of Color
- Logistics lead of Environmental Justice Committee meetings and events
- Project lead of a community design + build "parklet" with Ethiopian Community of Seattle and Sustainable Seattle

ENVIRONMENTAL JUSTICE & SERVICE EQUITY INTERN
SEATTLE PUBLIC UTILITIES **MAY 2014-AUGUST 2015**

Supported all project areas including Local Hazardous Waste Management program, community meetings for strategic business plan, and community engagement on food waste policy roll-out.

- Supported Chinese Information and Service Center & Puget Sound Sage to develop creative engagement events to support people of color, immigrants, refugee customers in learning about and participating in food waste composting requirement
- Updated and organized content for EJSE Division website
- Led logistics planning for Watershed Tours for underrepresented community members

VOLUNTEER WORK (All Current)

- Emerging Leader Fellow for Capitol Hill Housing
- Professionals Council Member for UW Master of Urban Planning Program
- Strategic Planning Committee member for UW College of Built Environments
- Mentor for RVC Green Pathways Fellowship

Community Roots Housing Public Development Authority

DECEMBER 2020

No less than 11 members and no more than 15 members: Pursuant to RCW 35.21.730 and Seattle Municipal Code 3.110, *all* members subject to City Council confirmation, *3*-year terms:

- *3* Mayor-appointed
- *8 to 12* Other Appointing Authority-appointed (specify): CHH Governing Council

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
2	M	5	1.	Member	**George Staggers**	**4/1/20**	**3/31/23**	**2**	Governing Council
3	M	3	3.	Member	Frank F Alvarado III	4/1/17	3/31/21	**4**	Governing Council
	F		3.	Member	**Sarah Cubillos**	**4/1/20**	**3/31/23**	1	Governing Council
2	F	4	4.	Member	**M. Michelle Purnell-Hepburn**	**4/1/20**	**3/31/23**	1	Governing Council
6	M	3	5.	Member	**Paul Breckenridge**	**4/1/20**	**3/31/23**	2	Governing Council
6	F	3	6.	Member	**Jill Cronauer**	**4/1/20**	**3/31/23**	**2**	Governing Council
6	F	3	7.	Member	Rachel Ben-Shmuel	4/1/19	3/31/22	3	Governing Council
2	F	N/A	8.	Member	**Michelle Morlan**	**4/1/20**	**3/31/23**	**1**	Governing Council
6	M	3	9.	Member	**Bob Fikso**	**4/1/20**	**3/31/23**	**2**	Governing Council
2	F	3	10.	Member	Barbara Nabors-Glass	4/1/18	3/31/21	2	Governing Council
6	M	3	11.	Member	Drew Porter	4/1/18	3/31/21	3	Governing Council
6	M	7	12.	Member	Chasten Fulbright	4/1/27	3/31/20	1	Mayor
6	M	3	13.	Member	Eric Snow	4/1/18	3/31/21	2	Mayor
9	F	7	14.	Member	Shalimar Gonzales	4/1/17	3/31/20	1	Mayor
4	M	3	15.	Member	**Derrick Belgarde**	**4/1/19**	**3/31/22**	2	Governing Council

SELF-IDENTIFIED DIVERSITY CHART

	Men	Women	Transgender	Unknown	Asian (1)	Black/ African American (2)	Hispanic/ Latino (3)	American Indian/ Alaska Native (4)	Other (Specification Optional) (5)	Caucasian/ Non-Hispanic (6)	Pacific Islander (7)	Middle Eastern (8)	Multiracial (9)
Mayor	2	1								2			1
Council	6	6				4	1	1		5			
Other													
Total	8	7				4	1	1		7			1

Key: ***D** List the corresponding *Diversity Chart* number (1 through 9) – Diversity information is self-identified & voluntary
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RD Residential Council District number 1 through 7 or N/A

Legislation Text

File #: Appt 01736, **Version:** 1

Reappointment of Bob Fikso as member, Community Roots Housing Public Development Authority Governing Council, for a term to March 31, 2023.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Bob Fikso*		
Board/Commission Name: *Community Roots Housing Public Development Authority*		**Position Title:** *Member*
☐ **Appointment** ***OR*** ☒ **Reappointment**	**City Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ City Council ☐ Mayor ☒ Other: *Governing Council*	**Term of Position: *** 4/1/2020 **to** 3/31/2023 ☐ *Serving remaining term of a vacant position*	
Residential Neighborhood: *Leschi*	**Zip Code:** *98122*	**Contact Phone No.:** [redacted]
Background: *Bob is a founding shareholder of Fikso Kretschmer Smith Dixon Ormseth, lawyers focusing on real estate and real estate finance transactions. Bob represents developers, homebuilders, and investors. He also is general counsel for closely held businesses. Before organizing FKSDO in 1995, Bob was a principal in Hillis Clark Martin & Peterson. Bob is a Trustee of Lucky Seven Foundation, with past service as President and Secretary. Previously, he served on the advisory board of Meredith Mathews East Madison YMCA, and was a director of Open Adoption & Family Services, a Portland-based adoption agency, and Center on Contemporary Art (COCA). He is a 1981 graduate of the University of Washington School of Law, and a 1978 graduate, in History, of Stanford University. Bob is a lifelong Seattleite, has three adult children, and resides with his husband in Leschi.*		
Authorizing Signature (original signature): **Date Signed (appointed):** April 13, 2020	**Appointing Signatory:** *Shalimar Gonzales* *Capitol Hill Housing Governing Council, Board Chair*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

BOB FIKSO

[redacted]

Professional Experience

1995- *Shareholder, Co-Founder*. **Fikso Kretschmer Smith Dixon Ormseth PS.**
Real estate, finance, and business transactions lawyer. Practice includes all aspects of commercial real estate and real estate finance--in particular, land acquisition, commercial leases, structuring and financing of limited liability companies and other ventures, development of master-planned communities and mixed-use projects, homebuilding sales and marketing, and borrowers' representation for A&D, construction, and permanent loans.

Business practice involves service as general counsel for several closely held businesses in a variety of industries, including an alternative newspaper and various web-based consumer businesses.

1981-1994 *Principal and Associate Attorney*, **Hillis Clark Martin & Peterson PS.** Principal, 1987-1993; Associate, 1981-1986.

Education

1981 University of Washington School of Law (J.D., With Honors, 1981).
Executive Articles Editor, *Washington Law Review*.

1978 Stanford University (A.B., History, With Distinction 1978).

Professional Strengths

Drafting and communication skills; understanding of client objectives; practicality; creative problem-solving skills; teamwork.

Community

Member, Property Development Committee, Capitol House Housing, 2013-
Director and Secretary, Lucky Seven Foundation, 1998-
Former Director, Open Adoption & Family Services, Portland and Seattle
Former Director, Meredith Mathews East Madison YMCA, Seattle
Former Director, Center on Contemporary Art (COCA), Seattle

Honors and Distinctions

"Super Lawyer," frequently since 2000, *Washington Law & Politics*
"Best Lawyers in the Business," 2013, *Seattle Business*
"Best Lawyers in Puget Sound Region," 2010, 2011, 2012 *Puget Sound Business Journal*
"Notable Practitioner," Real Estate: Washington, *Chambers USA* 2012-15

Bar Membership

Washington State Bar; Real Property, Probate & Trust Section
King County Bar Association

Other

Running, walking, reading, editing, youth and professional soccer fan, golf.
Lifelong Seattleite. Roosevelt High School, 1974. Three college-age children.

Community Roots Housing Public Development Authority

DECEMBER 2020

No less than 11 members and no more than 15 members: Pursuant to RCW 35.21.730 and Seattle Municipal Code 3.110, *all* members subject to City Council confirmation, *3*-year terms:

- *3* Mayor-appointed
- *8 to 12* Other Appointing Authority-appointed (specify): CHH Governing Council

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
2	M	5	1.	Member	**George Staggers**	**4/1/20**	**3/31/23**	**2**	Governing Council
3	M	3	3.	Member	Frank F Alvarado III	4/1/17	3/31/21	**4**	Governing Council
	F		3.	Member	**Sarah Cubillos**	**4/1/20**	**3/31/23**	1	Governing Council
2	F	4	4.	Member	**M. Michelle Purnell-Hepburn**	**4/1/20**	**3/31/23**	1	Governing Council
6	M	3	5.	Member	**Paul Breckenridge**	**4/1/20**	**3/31/23**	2	Governing Council
6	F	3	6.	Member	**Jill Cronauer**	**4/1/20**	**3/31/23**	**2**	Governing Council
6	F	3	7.	Member	Rachel Ben-Shmuel	4/1/19	3/31/22	3	Governing Council
2	F	N/A	8.	Member	**Michelle Morlan**	**4/1/20**	**3/31/23**	**1**	Governing Council
6	M	3	9.	Member	**Bob Fikso**	**4/1/20**	**3/31/23**	**2**	Governing Council
2	F	3	10.	Member	Barbara Nabors-Glass	4/1/18	3/31/21	2	Governing Council
6	M	3	11.	Member	Drew Porter	4/1/18	3/31/21	3	Governing Council
6	M	7	12.	Member	Chasten Fulbright	4/1/27	3/31/20	1	Mayor
6	M	3	13.	Member	Eric Snow	4/1/18	3/31/21	2	Mayor
9	F	7	14.	Member	Shalimar Gonzales	4/1/17	3/31/20	1	Mayor
4	M	3	15.	Member	**Derrick Belgarde**	**4/1/19**	**3/31/22**	2	Governing Council

SELF-IDENTIFIED DIVERSITY CHART

	Men	Women	Transgender	Unknown	Asian (1)	Black/ African American (2)	Hispanic/ Latino (3)	American Indian/ Alaska Native (4)	Other (Specification Optional) (5)	Caucasian/ Non-Hispanic (6)	Pacific Islander (7)	Middle Eastern (8)	Multiracial (9)
Mayor	2	1								2			1
Council	6	6				4	1	1		5			
Other													
Total	8	7				4	1	1		7			1

Key: ***D** List the corresponding *Diversity Chart* number (1 through 9) – Diversity information is self-identified & voluntary
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RD Residential Council District number 1 through 7 or N/A

Legislation Text

File #: Appt 01737, **Version:** 1

Appointment of Michelle Morlan as member, Community Roots Housing Public Development Authority Governing Council, for a term to March 31, 2023.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Michelle Morlan*		
Board/Commission Name: *Community Roots Housing Public Development Authority*		**Position Title:** *Member*
☒ **Appointment** ***OR*** ☐ **Reappointment**	**City Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ City Council ☐ Mayor ☒ Other: *Governing Council*	**Term of Position: *** 4/1/2020 **to** 3/31/2023 ☒ *Serving remaining term of a vacant position*	
Residential Neighborhood: *Vashon Island*	**Zip Code:** *98070*	**Contact Phone No.:** [redacted]

Background:

Michelle has been actively engaged in the direct development affordable housing and community facility projects for over 30 years. As Principal of Lotus Development Partners LLC, a mission-driven development consulting firm, Michelle oversees the work of Lotus team members and provides project management, finance strategy and development services for nonprofit housing owners, primary and behavioral health providers and for-profit developers interested in affordable housing inclusion.

Michelle was previously the western states underwriter for a national intermediary's New Markets Tax Credit program. In that capacity she facilitated investment in a variety of community and economic development projects. Since 1998, Michelle has managed development of more than 1,300 housing units including shelter beds, transitional housing and permanent supportive housing serving homeless individuals and adults with special needs.

She has also developed several community and social service facilities including three multi-service centers, two federally qualified health centers, integrated primary care and behavioral health clinics and several facilities serving low income youth.

Michelle holds Masters degrees in Social Work and Urban Planning from the University of Michigan. She is a past-Chair of the University of Washington Design and Urban Planning Professionals Council and serves on the Board of the Seattle-King County Housing Development Consortium.

Authorizing Signature (original signature): **Date Signed (appointed):** October 12, 2020	**Appointing Signatory:** *Shalimar Gonzales* *Community Roots Housing Governing Council, Board Chair*

**Term begin and end date is fixed and tied to the position and not the appointment date.*

MICHELLE MORLAN, PRINCIPAL

EXPERIENCE
Over thirty years of real estate development, finance, land use planning and social service experience in the nonprofit, for profit and public sector

Lotus Development Partners LLC, Principal – November 2015 – Present
- Lead development consulting firm providing full service real estate development project management and program development consulting for nonprofit, for profit and public sector housing and community development initiatives.

National Development Council, Director – April 2005 – October 2015
- Provided finance and development management services for housing, community facility and large scale economic development projects in Western U.S., Led West Region's New Markets Tax Credit finance underwriting; taught development finance training nation-wide

Common Ground, Senior Developer – 1998 – 2005
- Provided full service real estate development consulting to nonprofit organizations for affordable housing and community facilities (simultaneously managed multiple projects in site selection, entitlements, design, construction and lease-up phases), coordinating public and private financing resources using a variety of Federal, State and Local sources

King County Dept. of Development & Environmental Services, Current Planner 1997-98
- Implemented current land use planning and development review services for a large metropolitan county in Washington

City of Lacey, WA, Current & Long-range Planner – 1995-1997
- Implemented current land use planning and development review services; coordinated long range planning related to Downtown Plan

PATH Housing Development Corp., Honolulu, HI, VP of Real Estate Development 1993-95
- Coordinated all aspects of development planning & financing for start-up nonprofit

State of Hawaii House Housing Committee, Legislative Staff – 1993 Session
- Coordinated policy development for financing mechanism for State Housing Trust Fund

FINANCING EXPERIENCE:
HUD 202/811, HOME/CDBG, Sec. 108/BEDI, McKinney/SHP; NMTC /LIHTC / HTC; FEMA, State and Local Funding Sources in WA, Oregon, Montana, Hawaii, California; Permanent Conventional Financing, FHA, FHLB; Bonds, SBA 7a and Commercial Revolving Loan Funds

EDUCATION/CERTIFICATIONS
Masters of Urban Planning/Masters of Social Work, University of Michigan 1992
BA, Social Work/ Sociology, Purdue University, 1989
Board Member, Seattle-King County Housing Development Consortium

Community Roots Housing Public Development Authority

DECEMBER 2020

No less than 11 members and no more than 15 members: Pursuant to RCW 35.21.730 and Seattle Municipal Code 3.110, *all* members subject to City Council confirmation, *3*-year terms:

- *3* Mayor-appointed
- *8 to 12* Other Appointing Authority-appointed (specify): CHH Governing Council

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
2	M	5	1.	Member	**George Staggers**	**4/1/20**	**3/31/23**	**2**	Governing Council
3	M	3	3.	Member	Frank F Alvarado III	4/1/17	3/31/21	**4**	Governing Council
	F		3.	Member	**Sarah Cubillos**	**4/1/20**	**3/31/23**	1	Governing Council
2	F	4	4.	Member	**M. Michelle Purnell-Hepburn**	**4/1/20**	**3/31/23**	1	Governing Council
6	M	3	5.	Member	**Paul Breckenridge**	**4/1/20**	**3/31/23**	2	Governing Council
6	F	3	6.	Member	**Jill Cronauer**	**4/1/20**	**3/31/23**	**2**	Governing Council
6	F	3	7.	Member	Rachel Ben-Shmuel	4/1/19	3/31/22	3	Governing Council
2	F	N/A	8.	Member	**Michelle Morlan**	**4/1/20**	**3/31/23**	**1**	Governing Council
6	M	3	9.	Member	**Bob Fikso**	**4/1/20**	**3/31/23**	**2**	Governing Council
2	F	3	10.	Member	Barbara Nabors-Glass	4/1/18	3/31/21	2	Governing Council
6	M	3	11.	Member	Drew Porter	4/1/18	3/31/21	3	Governing Council
6	M	7	12.	Member	Chasten Fulbright	4/1/27	3/31/20	1	Mayor
6	M	3	13.	Member	Eric Snow	4/1/18	3/31/21	2	Mayor
9	F	7	14.	Member	Shalimar Gonzales	4/1/17	3/31/20	1	Mayor
4	M	3	15.	Member	**Derrick Belgarde**	**4/1/19**	**3/31/22**	2	Governing Council

SELF-IDENTIFIED DIVERSITY CHART

	Men	Women	Transgender	Unknown	Asian (1)	Black/ African American (2)	Hispanic/ Latino (3)	American Indian/ Alaska Native (4)	Other (Specification Optional) (5)	Caucasian/ Non-Hispanic (6)	Pacific Islander (7)	Middle Eastern (8)	Multiracial (9)
Mayor	2	1								2			1
Council	6	6				4	1	1		5			
Other													
Total	8	7				4	1	1		7			1

Key: ***D** List the corresponding *Diversity Chart* number (1 through 9) – Diversity information is self-identified & voluntary
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RD Residential Council District number 1 through 7 or N/A

Legislation Text

File #: Appt 01738, **Version:** 1

Appointment of M. Michelle Purnell-Hepburn as member, Community Roots Housing Public Development Authority Governing Council, for a term to March 31, 2023.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *M. Michelle Purnell-Hepburn*		
Board/Commission Name: *Community Roots Housing Public Development Authority*		**Position Title:** *Board Member*
☒ **Appointment** ***OR*** ☐ **Reappointment**	**City Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ City Council ☐ Mayor ☒ Other: *Governing Council*	**Term of Position: *** 4/1/2020 **to** 3/31/2023 ☐ *Serving remaining term of a vacant position*	
Residential Neighborhood: *Queen Anne*	**Zip Code:** *98119-2525*	**Contact Phone No.:** [redacted]
Background: *See attached*		
Authorizing Signature (original signature): Michelle Purnell-Hepburn X *Michelle Purnell-Hepburn* **Date Signed (appointed):** July 14, 2020	**Appointing Signatory:** *Shalimar Gonzales* *Community Roots Housing, Board Chair*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

M. Michelle Purnell-Hepburn

M. Michelle Purnell-Hepburn has been appointed to the position of DEI Director of the Seattle Foundation as of June 2020. Ms. Purnell-Hepburn joined the organization as its Managing Director, Controller and Accounting in June 2018. Prior to this, she was Vice-President/Controller of Salal Credit Union from 2012 to 2018, SVP/Chief Financial Officer at Seattle Metropolitan Credit Union from 1999 to 2011 and Vice-President of Finance at Group Health Credit Union from 1989 to 1999. She has worked in the accounting and finance field since 1982 in both the high-tech industry as well as credit unions. Michelle earned her Bachelor of Arts degree in finance and economics and her Masters of Business Administration degree, specializing in finance and accounting, from the University of Washington. She was President of the Association of Black Business Students during her graduate school years.

Michelle is a past board member of the Group Health Foundation and Express Credit Union, serving on the Executive Committee of both organizations and a past board member of Zion Preparatory Academy. She is a past a board member of the King County Chapter of Credit Unions, serving as Treasurer and President, and past Board Treasurer of the African-American Credit Union Coalition. She is a Past Matron of Mt. Rainier Chapter of the Order of the Eastern Star. From 2009-2011, she was asked to be a Project II reader for Western CUNA Management School by President James Likens, resuming that role in 2013. Michelle was appointed to Advisory Board of Capitol Hill Housing to preserve the legacy and site of Liberty Bank of Seattle, which was founded by her parents and in April 2020 was elected to the Board of Trustees of Community Roots Housing.

A Seattle native, she is very happily married, has two stepsons, a goddaughter and lives on Queen Anne Hill, enjoying all aspects of city life. Michelle is a vocalist and has given concerts for the Philorati Club as fundraisers for scholarships, and currently is a singer in The Approximations, a local band lead by King County Prosecuting Attorney, Dan Satterberg.

Her hobbies include swimming, yoga, biking and walking, as she is a former tri-athlete, completing her first triathlon in August 2000 and her first half-marathon in 2007. More recently, she studies hula, joining Na Hanu ‘O Ku’uleialoha, a local halau (hula school) based in Burien and participated in her first group competition in August 2002.

Community Roots Housing Public Development Authority

DECEMBER 2020

No less than 11 members and no more than 15 members: Pursuant to RCW 35.21.730 and Seattle Municipal Code 3.110, *all* members subject to City Council confirmation, *3*-year terms:

- *3* Mayor-appointed
- *8 to 12* Other Appointing Authority-appointed (specify): CHH Governing Council

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
2	M	5	1.	Member	**George Staggers**	**4/1/20**	**3/31/23**	**2**	Governing Council
3	M	3	3.	Member	Frank F Alvarado III	4/1/17	3/31/21	**4**	Governing Council
	F		3.	Member	**Sarah Cubillos**	**4/1/20**	**3/31/23**	1	Governing Council
2	F	4	4.	Member	**M. Michelle Purnell-Hepburn**	**4/1/20**	**3/31/23**	1	Governing Council
6	M	3	5.	Member	**Paul Breckenridge**	**4/1/20**	**3/31/23**	2	Governing Council
6	F	3	6.	Member	**Jill Cronauer**	**4/1/20**	**3/31/23**	**2**	Governing Council
6	F	3	7.	Member	Rachel Ben-Shmuel	4/1/19	3/31/22	3	Governing Council
2	F	N/A	8.	Member	**Michelle Morlan**	**4/1/20**	**3/31/23**	**1**	Governing Council
6	M	3	9.	Member	**Bob Fikso**	**4/1/20**	**3/31/23**	**2**	Governing Council
2	F	3	10.	Member	Barbara Nabors-Glass	4/1/18	3/31/21	2	Governing Council
6	M	3	11.	Member	Drew Porter	4/1/18	3/31/21	3	Governing Council
6	M	7	12.	Member	Chasten Fulbright	4/1/27	3/31/20	1	Mayor
6	M	3	13.	Member	Eric Snow	4/1/18	3/31/21	2	Mayor
9	F	7	14.	Member	Shalimar Gonzales	4/1/17	3/31/20	1	Mayor
4	M	3	15.	Member	**Derrick Belgarde**	**4/1/19**	**3/31/22**	2	Governing Council

SELF-IDENTIFIED DIVERSITY CHART

	Men	Women	Transgender	Unknown	Asian (1)	Black/ African American (2)	Hispanic/ Latino (3)	American Indian/ Alaska Native (4)	Other (Specification Optional) (5)	Caucasian/ Non-Hispanic (6)	Pacific Islander (7)	Middle Eastern (8)	Multiracial (9)
Mayor	2	1								2			1
Council	6	6				4	1	1		5			
Other													
Total	8	7				4	1	1		7			1

Key: ***D** List the corresponding *Diversity Chart* number (1 through 9) – Diversity information is self-identified & voluntary
****G** List *gender*, **M** = Male, **F**= Female, **T**= Transgender, **U**= Unknown
RD Residential Council District number 1 through 7 or N/A

Legislation Text

File #: Appt 01739, **Version:** 1

Reappointment of George M. Staggers as member, Community Roots Housing Public Development Authority Governing Council, for a term to March 31, 2023.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *George Staggers*		
Board/Commission Name: *Community Roots Housing Public Development Authority*		**Position Title:** *Member*
☐ **Appointment** ***OR*** ☒ **Reappointment**	**City Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ City Council ☐ Mayor ☒ Other: *Governing Council*	**Term of Position: *** 4/1/2020 **to** 3/31/2023 ☐ *Serving remaining term of a vacant position*	
Residential Neighborhood: *Meadowbrook*	**Zip Code:** *98125*	**Contact Phone No.*:*** [redacted]
Background: *George played a key role in navigating the direction of Central Area Development Association (CADA). He was the Chief Executive Officer of CADA since its inception in 1994. George's responsibilities included ensuring that CADA meets the objectives of its mission and overall organizational management. George holds a bachelor's degree from Central Washington University and has 20 years' work experience in the financial industry. George grew up within blocks of the CADA office. George is an active board member for Community Capital Development, First Place School, and Seattle Neighborhood Group.*		
Authorizing Signature (original signature): **Date Signed (appointed):** November 9, 2020	**Appointing Signatory:** *Shalimar Gonzales* *Community Roots Housing Governing Council, Board Chair*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

George M. Staggers

Employment History

March 1994-Present — Central Area Development Association — Seattle, WA
Chief Executive Officer

- Direct operations of start-up non-profit community development organization. Develop strategic plans, policies, and procedures.
- Build community and board support for projects.
- Coordination development activities with community organizations, businesses, and residents.
- Directly involved with land acquisition, project oversight, contractor selection, and joint venture partnerships, including new construction mixed-use developments from concept to completion and lease-up.

Oct. 1992-July 1993 — Emerald City Bank — Seattle, WA
President

- Led organization through a period of crisis.
- Successfully sold/transferred bank assets while maintaining positive community relationships.
- Worked closely with corporate/individual shareholders, community leaders, and State and Federal bank regulators to resolve issues.
- Received letter of Recognition from State Banking Supervisor.

June 1972-Nov. 1993 — Bank of America/Security Pacific Bank — Seattle, WA
Vice President and Manager

- Responsible for the administration and staffing for the Washington state region.
- Negotiated large contracts with contingency, retainer, and temporary search agencies.
- Member of merger/redevelopment team.
- Managed In-house temporary employee pool of 100+.
- Division Campaign Leader, United Way.
- Macabees member.

- Bank Management Training Program-
  Operations/Auditing/Consumer Lending/Dealer
  Finance/Residential Real Estate Lending

Education: Central Washington University, BA Ellensburg, WA

Additional Specialized Education/Training:

Neighborhood Reinvestment Training Institute:

Asset Management
Real Estate Development/Commercial/Mixed-Use
Deal Structuring/Real Estate
Community Organizing
Certificate

Harvard University:
Boston MA

Community Development Training, Housing & Urban Development/Organizing/Real Estate Development
Certificate

Development Training Institute:
Baltimore, Maryland

Community Organizing/Planning/Leadership
Housing/Urban Issues
Certificate

Washington Academy for Economic Development (WACED)
Washington State

Completed all required courses in community/economic development, organizing, planning and leadership
Certificate

Active Board Member: Community Capital Development; First Place School & Social Services; Seattle Housing Authority, Yesler Terrace Advisory; Chase Bank Community Development Advisory Committee.

Community Roots Housing Public Development Authority

DECEMBER 2020

No less than 11 members and no more than 15 members: Pursuant to RCW 35.21.730 and Seattle Municipal Code 3.110, *all* members subject to City Council confirmation, *3*-year terms:

- *3* Mayor-appointed
- *8 to 12* Other Appointing Authority-appointed (specify): CHH Governing Council

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
2	M	5	1.	Member	**George Staggers**	**4/1/20**	**3/31/23**	**2**	Governing Council
3	M	3	3.	Member	Frank F Alvarado III	4/1/17	3/31/21	**4**	Governing Council
	F		3.	Member	**Sarah Cubillos**	**4/1/20**	**3/31/23**	1	Governing Council
2	F	4	4.	Member	**M. Michelle Purnell-Hepburn**	**4/1/20**	**3/31/23**	1	Governing Council
6	M	3	5.	Member	**Paul Breckenridge**	**4/1/20**	**3/31/23**	2	Governing Council
6	F	3	6.	Member	**Jill Cronauer**	**4/1/20**	**3/31/23**	**2**	Governing Council
6	F	3	7.	Member	Rachel Ben-Shmuel	4/1/19	3/31/22	3	Governing Council
2	F	N/A	8.	Member	**Michelle Morlan**	**4/1/20**	**3/31/23**	**1**	Governing Council
6	M	3	9.	Member	**Bob Fikso**	**4/1/20**	**3/31/23**	**2**	Governing Council
2	F	3	10.	Member	Barbara Nabors-Glass	4/1/18	3/31/21	2	Governing Council
6	M	3	11.	Member	Drew Porter	4/1/18	3/31/21	3	Governing Council
6	M	7	12.	Member	Chasten Fulbright	4/1/27	3/31/20	1	Mayor
6	M	3	13.	Member	Eric Snow	4/1/18	3/31/21	2	Mayor
9	F	7	14.	Member	Shalimar Gonzales	4/1/17	3/31/20	1	Mayor
4	M	3	15.	Member	**Derrick Belgarde**	**4/1/19**	**3/31/22**	2	Governing Council

SELF-IDENTIFIED DIVERSITY CHART

	Men	Women	Transgender	Unknown	Asian (1)	Black/ African American (2)	Hispanic/ Latino (3)	American Indian/ Alaska Native (4)	Other (Specification Optional) (5)	Caucasian/ Non-Hispanic (6)	Pacific Islander (7)	Middle Eastern (8)	Multiracial (9)
Mayor	2	1								2			1
Council	6	6				4	1	1		5			
Other													
Total	8	7				4	1	1		7			1

Key: ***D** List the corresponding *Diversity Chart* number (1 through 9) – Diversity information is self-identified & voluntary
****G** List *gender*, **M** = Male, **F**= Female, **T**= Transgender, **U**= Unknown
RD Residential Council District number 1 through 7 or N/A

Legislation Text

File #: Appt 01740, **Version:** 1

Reappointment of Derrick L. Belgarde as member, Community Roots Housing Public Development Authority Governing Council, for a term to March 31, 2022.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: **Derrick Belgarde**		
Board/Commission Name: ~~Capitol Hill Housing Improvement Program~~ Community Roots Housing Public Development Authority HS		**Position Title:** Member
☐ **Appointment** *OR* ☒ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ~~☒ Council~~ ☐ Mayor ☒ Other: ~~*Fill in appointing authority*~~ CHH Governing Council	**Date Appointed:** 4/8/2019	**Term of Position: *** 4/1/2019 **to** 3/31/2022 ☐ *Serving remaining term of a vacant position*
Residential Neighborhood/Council District: Capitol Hill/Council District 3	**Zip Code:** 98112	**Contact Phone No.:** [redacted]

Background: Derrick has been a resident of Capitol Hill since 2011. He is currently the program director for Chief Seattle Club, a day-center that serves urban Native American's. Prior to that, he worked for El Centro de la Raza as a food bank & hot meal coordinator as well as a job developer. Derrick also resides on the Affordable Housing Advisory Board (AHAB). He completed his undergraduate from Seattle University (SU) in 2013 with high honors in public affairs, and went on to complete his master's in public administration in 2015 at SU.
This reappointment represents Mr. Belgarde's second term.

Authorizing Signature (original signature):	**Appointing Signatory:** Robert Schwartz, Chair Capitol Hill Housing Governing Council

FILED
CITY OF SEATTLE
19 MAY 20 AM 8:11
CITY CLERK

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Derrick Leonard Belgarde

Experience

Chief Seattle Club 2/1/2015 - Present Seattle, WA

Program Manager

- Oversee all programming at the Chief Seattle Club; such as hygiene services, art programs, physical activities, and spiritual programs.
- Create and implement new programs as needed.
- Responsible for Member Services budget.
- Administrator for Agency account.
- Supervise 4-6 employees.

El Centro de la Raza 4/1/2014 – 1/31/2015 Seattle, WA

Food Bank Coordinator/Hot Meal Coordinator

- Oversee the day-to-day operations of the Food Bank and Hot Meal Programs.
- Track daily participation for monthly billing and reporting purposes.
- Meet all monthly targets and goals.
- Keep all systems and databases updated and current.
- Represent El Centro de la Raza by attending all local emergency food meetings (i.e. the Meal Partnership Coalition and the Seattle Food Committee).

El Centro de la Raza 4/1/2014 - Present Seattle, WA

Job Developer

- Assist participants in finding and securing full-time & permanent employment by establishing and maintaining working relationships with local employers.
- Assist the employment specialist in planning routine employment workshops.
- Track and monitor progress of participants to ensure goals are being met.
- Maintain program information in databases such as Salesforce.
- Attend all relevant local job fairs and meetings that relate to employment seeking.

El Centro de la Raza 1/2012 – 4/1/2014 Seattle, WA

Special Projects Coordinator

- Assist the Director of Human Services in managing the daily operation of the human services department.
- Plan and prepare monthly billings for various programs and grants
- Organize, file, and maintain vital documents such as Grant Contracts, MOU's, & Billings
- Maintain program data in databases such as Salesforce or HMIS(Safe Harbors)
- Plan staff meetings, send out interoffice memos and emails
- Attend misc. meetings that pertain to programs within Human Services Dept.
- Temporarily fill in for other program coordinators such as the Food bank, Hot Meal, & Senior programs.
    - In the Seniors program
        - Conducted daily intakes.
        - Helped in the preparation and serving of their nutritious meals.
        - Coordinate the daily exercise activities.

*Letters of recommendation available upon request

El Centro de la Raza Spring Quarter 2012 Seattle, WA
Housing Case Manager Intern

- Assist the Lead Homelessness Assistance Case Manager in the intake & assessment of participants.
- Performed home inspections prior to participant move-in.
- Managed, maintained, and updated participant case files and case notes (case management)

Population Connection 2012 - Present Washington D.C.
Lobbyist

- Lobbied for funding and access of global family planning for women in developing countries
- Lobbied to the Washington States Representatives & Senators on Capitol Hill in Washington D.C. and in their local offices in the state of Washington
- Planned and set meetings for groups to meet with the Congressperson's Staff

Education

2013 - 2015 Seattle University Seattle, WA

- M.P.A., Master of Public Administration
- G.P.A. – 3.825

2011 - 2013 Seattle University Seattle, WA

- Graduated Magna Cum Laude – G.P.A. 3.791
- B.A., Public Affairs w/ emphasis in Nonprofit Leadership, & w/ Minor in Sociology
- Member of the Tau Sigma Honors' Society
- Member of the Pi Alpha Alpha Honor Society (National Public Administration Honor Society)
- Dean's List

2010 - 2011 Seattle Central Community College Seattle, WA

- A.A., Transfer Degree

Interests

Volunteering, traditional Native American bead & leatherwork, reading, & spending time with my family.

*Letters of recommendation available upon request

Community Roots Housing Public Development Authority

DECEMBER 2020

No less than 11 members and no more than 15 members: Pursuant to RCW 35.21.730 and Seattle Municipal Code 3.110, *all* members subject to City Council confirmation, *3*-year terms:

- *3* Mayor-appointed
- *8 to 12* Other Appointing Authority-appointed (specify): CHH Governing Council

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
2	M	5	1.	Member	**George Staggers**	**4/1/20**	**3/31/23**	**2**	Governing Council
3	M	3	3.	Member	Frank F Alvarado III	4/1/17	3/31/21	**4**	Governing Council
	F		3.	Member	**Sarah Cubillos**	**4/1/20**	**3/31/23**	1	Governing Council
2	F	4	4.	Member	**M. Michelle Purnell-Hepburn**	**4/1/20**	**3/31/23**	1	Governing Council
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6	F	3	6.	Member	**Jill Cronauer**	**4/1/20**	**3/31/23**	**2**	Governing Council
6	F	3	7.	Member	Rachel Ben-Shmuel	4/1/19	3/31/22	3	Governing Council
2	F	N/A	8.	Member	**Michelle Morlan**	**4/1/20**	**3/31/23**	**1**	Governing Council
6	M	3	9.	Member	**Bob Fikso**	**4/1/20**	**3/31/23**	**2**	Governing Council
2	F	3	10.	Member	Barbara Nabors-Glass	4/1/18	3/31/21	2	Governing Council
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6	M	7	12.	Member	Chasten Fulbright	4/1/27	3/31/20	1	Mayor
6	M	3	13.	Member	Eric Snow	4/1/18	3/31/21	2	Mayor
9	F	7	14.	Member	Shalimar Gonzales	4/1/17	3/31/20	1	Mayor
4	M	3	15.	Member	**Derrick Belgarde**	**4/1/19**	**3/31/22**	2	Governing Council

SELF-IDENTIFIED DIVERSITY CHART

	Men	Women	Transgender	Unknown	Asian (1)	Black/ African American (2)	Hispanic/ Latino (3)	American Indian/ Alaska Native (4)	Other (Specification Optional) (5)	Caucasian/ Non-Hispanic (6)	Pacific Islander (7)	Middle Eastern (8)	Multiracial (9)
Mayor	2	1								2			1
Council	6	6				4	1	1		5			
Other													
Total	8	7				4	1	1		7			1

Key: ***D** List the corresponding *Diversity Chart* number (1 through 9) – Diversity information is self-identified & voluntary
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RD Residential Council District number 1 through 7 or N/A

Legislation Text

File #: Appt 01752, **Version:** 1

Reappointment of Rachel Ben-Shmuel as member, Community Roots Housing Public Development Authority Governing Council, for a term to March 31, 2022.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: **Rachel Ben-Shmuel**		
Board/Commission Name: ~~Capitol Hill Housing Improvement Program~~ Community Roots Housing Public Development Authority		**Position Title:** Member
☐ **Appointment** *OR* ☒ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☒ ~~Council~~ ☐ Mayor ☒ Other: ~~*Fill in appointing authority*~~ CHH Governing Council	**Date Appointed:** 4/8/2019	**Term of Position: *** 4/1/2019 **to** 3/31/2022 ☐ *Serving remaining term of a vacant position*
Residential Neighborhood/Council District: Montlake/Council District 3	**Zip Code:** 98112	**Contact Phone No.:** [redacted]

Background: Rachel recently retired from Vulcan Real Estate, where she had been a Senior Project Manager since 2005. Prior to that, she managed permitting for the Seattle Monorail Project. From 1990 to 2002, Rachel led a consulting practice that provided land use advice, government relations support and permit management to attorneys, developers, architects and local governments. She was executive director of the Seattle Planning Commission from 1984 to 1988, during which time the Commission developed a model for neighborhood planning and citizen involvement in the budget process that is still in use today. Rachel has been a member of the City of Seattle Transportation Levy Oversight Committee since 2016. She holds a BA in history from the University of Wisconsin and an MA in Russian area studies from the University of Washington.

This reappointment represents Ms. Ben-Shmuel's 4th term.

Authorizing Signature (original signature):	**Appointing Signatory:** Robert Schwartz, Chair Capitol Hill Housing Governing Council

FILED
CITY OF SEATTLE
19 MAY 20 AM 8: 11
CITY CLERK

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Rachel Ben-Shmuel

[redacted]

Employment History

Senior Project Manager
Vulcan Real Estate (June 2005 to 2019)
Managing permitting for Vulcan Real Estate projects in South Lake Union, creating a mixed use, transit- and pedestrian-oriented neighborhood. Obtained City of Seattle approvals to construct new Amazon.com headquarters in South Lake Union, 1.7 million SF, 11 buildings on six blocks.

Organized a Vulcan team in 2006 to coordinate with the City permitting efforts. The team has addressed permit, utility and construction issues, including simultaneous construction of the South Lake Union Streetcar and three Vulcan mixed-use projects.

Successfully negotiated a Memorandum of Agreement between Vulcan and Seattle Public Utilities to jointly construct a bio-swale in Seattle's Cascade neighborhood. The swale will annually clean close to 2 million gallons of stormwater flowing into Lake Union.

Manager, Permitting and Special Projects
Seattle Monorail Project (January 2003 to May 2005)
Prepared Land Use Code revisions to authorize construction of Seattle Monorail 14-mile alignment from Ballard to West Seattle. Helped gain Seattle City Council approval for the project.

Developed a Monorail streamlined permit process with the Department of Planning and Development.

Managed the design review process with the Monorail Review Panel, a City of Seattle panel charged with making design recommendations.

President, Ben-Shmuel and Associates (April 1992 to December 2002)
Owned a consulting practice that provided land use advice, government relations support, and permit management to attorneys, developers, architects and local governments. Examples of work and clients follow:

- Permit management for Mariners Baseball Stadium Public Facilities District, Seahawks Public Stadium Authority, Sound Transit Light Rail, King County's Central/Atlantic Base Expansion.
- Permit management for University of Washington projects including expansion of the Medical Center complex, Southwest Campus project, the Law School, Electrical Engineering and Computer Sciences Buildings. Represented the University in working with City of Seattle departments to improve University-City relationships.
- Permit management for other medical institutions including the Fred Hutchinson Cancer Center, Cancer Care Alliance, Providence Medical Center, Harborview Medical Center, Virginia Mason Medical Center and Northwest Hospital. Managed Plan Amendments for Major Institution Master Plans.
- Prepared a cooperation agreement between the Seattle School District and City of Seattle to govern permit and plan review for a school bond construction program.
- Provided government relations and permit management for private development companies, including Intracorp, Touchstone, Fortune, TJI, Harbor Properties and many others.

Project Manager, Polygon Corporation (April 1990 to March 1992)
Provided government relations and permit management for Polygon Corporation's Belltown residential projects, 400 units.

Manager, Land Use Information Section
Seattle Department of Construction and Land Use (1988 to 1990)
Managed the employee team which provided public notice about development projects. Researched land use and zoning code inquiries from the public.

Executive Director
Seattle Planning Commission (1984 to 1988)
Managed staff for the City of Seattle Planning Commission. In 1987-88, at Council request, developed a model for neighborhood planning and citizen involvement in the budget process that was adopted in its entirely by the City Council and is in use today.

Government Relations Analyst
METRO (1979 to 1984)
Conducted analyses of proposed local, state and federal legislation having a potential impact on Metro. Worked on Metro-related issues and legislation during the State legislative sessions.

Education

University of Wisconsin, BA, History
University of Washington, MA, Russian Area Studies (political science and history)

Community Leadership

Mentor for CityYear volunteers, 2007-2011
Member, Chamber of Commerce Leadership Tomorrow Curriculum Committee, 2004 to 2007
Panelist, World Trade Organization City Council Review Committee, 2000
Member, Seattle Commons Board and Executive Committee, 1994 to 1996
Volunteer, Bailey Boushay House, 1990 to 1993
Board Member, Capitol Hill Housing Improvement, 1984 to 1988 and 2011-Present

Contact Information

[redacted]

References available upon request

Community Roots Housing Public Development Authority

DECEMBER 2020

No less than 11 members and no more than 15 members: Pursuant to RCW 35.21.730 and Seattle Municipal Code 3.110, *all* members subject to City Council confirmation, *3*-year terms:

- *3* Mayor-appointed
- *8 to 12* Other Appointing Authority-appointed (specify): CHH Governing Council

Roster:

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	F		3.	Member	**Sarah Cubillos**	**4/1/20**	**3/31/23**	1	Governing Council
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6	F	3	6.	Member	**Jill Cronauer**	**4/1/20**	**3/31/23**	**2**	Governing Council
6	F	3	7.	Member	Rachel Ben-Shmuel	4/1/19	3/31/22	3	Governing Council
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6	M	3	13.	Member	Eric Snow	4/1/18	3/31/21	2	Mayor
9	F	7	14.	Member	Shalimar Gonzales	4/1/17	3/31/20	1	Mayor
4	M	3	15.	Member	**Derrick Belgarde**	**4/1/19**	**3/31/22**	2	Governing Council

SELF-IDENTIFIED DIVERSITY CHART

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Mayor	2	1								2			1
Council	6	6				4	1	1		5			
Other													
Total	8	7				4	1	1		7			1

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RD Residential Council District number 1 through 7 or N/A

Legislation Text

File #: Appt 01760, **Version:** 1

Appointment of Jeanie Chunn as member, Labor Standards Advisory Commission, for a term to April 30, 2022.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Jeanie Chunn*		
Board/Commission Name: *Labor Standards Advisory Commission*		**Position Title:** *Member, Position 14*
☒ **Appointment** ***OR*** ☐ **Reappointment**	**City Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☒ City Council ☐ Mayor ☐ Other: *Fill in appointing authority*	**Term of Position: *** 5/1/2020 **to** 4/30/2022 ☐ *Serving remaining term of a vacant position*	
Residential Neighborhood: *District 3*	**Zip Code:** *98122*	**Contact Phone No.*:*** [redacted]
Background: *Jeanie is the National Engagement Director for RAISE: High Road Restaurants, a national coalition of restaurant owners committed to workers rights. She has spent the last 20 years managing some of the best restaurants in Seattle including Campagne, Canlis, and The Corson Building. In response to COVID, Jeanie co-founded Seattle Restaurants United, a coalition of over 200 restaurants, to advocate for the industry. She is the co-chair of the policy committee for the Independent Restaurant Coalition and helped pen the RESTAURANTS Act of 2020. Jeanie believes that the restaurant community helps define our culture and is committed to building an industry that ensures equity and dignity for all.*		
Authorizing Signature (original signature): T. Mosqueda **Date Signed (appointed): 1/7/2021**	**Appointing Signatory:** *Teresa Mosqueda* *Seattle City Councilmember, Position 8*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

JEANIE CHUNN

[redacted] [redacted]

[redacted]

EXPERIENCE

Director of Engagement: RAISE High Road Restaurants
Aug. 2020- present

Director of Operations: Sea Creatures *Jan. 2016 – March 2020*

Events Manager: Sea Creatures *Nov. 2015 – Dec. 2015*

1060 East Union
Seattle, WA
206.900.8808

Oversee all aspects of events and hospitality within Sea Creatures Restaurant Group. Responsibilities include developing and managing private and community outreach events, marketing and promoting events, setting budgets to ensure profitability, and managing all hospitality and events' staff and contractors

Event Planner: Freelance *May 2010 – present*

Develop events that are unique and personal to the client, research and create concept designs for the client, hire and manage all vendors, book musicians and entertainment, write budgets, obtain necessary permits, create detailed timelines and floor plans. For non-profit organizations, find partnerships to donate in-kind gifts and help in fundraising capacities.

1309 East Olive St
Seattle, WA
206.255.4562

Event Planner / Assistant – Private Family *May 2013 – Oct. 2015*

Assisted the family with all event planning needs, including small private fundraising events, art openings, writer events, and two destination weddings. Responsibilities included working with all vendors, arranging rentals, booking musicians, working with house staff, and creating and implementing a "wow" experience for guests. Assisted in coordinating trips as near as Los Angeles and as far as South Africa.

Private Residence
Washington Park
Seattle, WA

Director of Events and Operations: The Corson Building
Dec. 2010 – May 2013

Worked with clients and guests to provide memorable and meaningful events and experiences. Responsibilities included private event sales, event coordination, public relations, marketing, and cost management.

5609 Corson Ave.
Seattle, WA
206.762.3330

Dining Room Manager: Canlis *Sept. 2008 – Oct. 2010*

Created a harmonious dining experience though building and cultivating relationships with staff and esteemed guests. Responsibilities included hiring, training, and scheduling a staff of fifty; and managing operational expenses.

2576 Aurora Ave.
Seattle, WA
206.283.3313

JEANIE CHUNN

[redacted] [redacted]

[redacted]

EDUCATION

Court of Master Sommeliers – Level One Sommelier
October 2010

University of Washington – Early Childhood Development
August 1999 – May 2000

American Conservatory Theatre – Improvisation
January 1994 – January 1996

REFERENCES

Barb and Charlie Wright, *Charles and Barbara Wright Foundation*
[redacted]

Bill True – Chairman, *Gull Industries*
[redacted]

Matt Dillon - Owner, *Matt Dillon Restaurants*
[redacted]

Simon Snellgrove – Founder, *Pacific Waterfront Partners*
[redacted]

Lou Hine – Director for Volunteer Engagement, *UW Advancement*
[redacted]

Labor Standards Advisory Commission

15 Members: Pursuant to *Ord. 124643, all* members subject to City Council confirmation, *2*-year terms:

- *7* City Council-appointed
- *7* Mayor-appointed
- *1* Other Appointing Authority-appointed (specify): Commission-appointed

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
	F	2	1.	Commissioner	Elizabeth Ford	5/1/19	4/30/21	2	Mayor
			2.	Commissioner	Vacant	5/1/20	4/30/22		Mayor
			3.	Commissioner	Vacant	5/1/19	4/30/21		Mayor
			4.	Commissioner	Vacant	5/1/20	4/30/22		Mayor
			5.	Commissioner	Vacant	5/1/19	4/30/21		Mayor
			6.	Commissioner	Vacant	5/1/20	4/30/22		Mayor
	F		7.	Commissioner	Betsy McFeely	5/1/19	4/30/21	1	Mayor
			8.	Commissioner	Artie M. Nosrati	5/1/20	4/30/22	2	City Council
			9.	Commissioner	Will Pittz	5/1/19	4/30/21	1	City Council
6	F	1	10.	Commissioner	Samantha Grad	5/1/20	4/30/22	2	City Council
			11.	Commissioner	Gay Gilmore	5/1/19	4/30/21	1	City Council
6	F	NA	12.	Commissioner	Ilona Lohrey	5/1/20	4/30/22	1	City Council
6	F	2	13.	Commissioner	Marilyn P. Watkins	5/1/19	4/30/21	1	City Council
1	F	3	14.	Commissioner	Jeanie Chunn	5/1/20	4/30/22	1	City Council
			15.	Commissioner	Vacant	5/1/19	4/30/21		Commission

SELF-IDENTIFIED DIVERSITY CHART

	Male	Female	Transgender	NB/ O/ U	Asian (1)	Black/ African American (2)	Hispanic/ Latino (3)	American Indian/ Alaska Native (4)	Other (5)	Caucasian/ Non-Hispanic (6)	Pacific Islander (7)	Middle Eastern (8)	Multiracial (9)
Mayor		2											
Council		4			1					3			
Other													
Total		6			1					3			

Key:

***D** List the corresponding *Diversity Chart* number (1 through 9)
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RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01761, **Version:** 1

Appointment of Ilona Lohrey as member, Labor Standards Advisory Commission, for a term to April 30, 2022.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Ilona Lohrey*		
Board/Commission Name: *Labor Standards Advisory Commission*		**Position Title:** *Member, Position 12*
☒ **Appointment** ***OR*** ☐ **Reappointment**	**City Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☒ City Council ☐ Mayor ☐ Other: *Fill in appointing authority*	**Term of Position: *** 5/1/2020 **to** 4/30/2022 ☐ *Serving remaining term of a vacant position*	
Residential Neighborhood: *NA/Snohomish County*	**Zip Code:** *98036*	**Contact Phone No.*:*** [redacted]
Background: *Ilona Lohrey is the VP of Membership & Programs at GSBA, Washington's LGBTQ & allied chamber of commerce, which represents over 1,300 businesses. Her work focuses on business development, technical assistance, and supplier diversity. She helped create the Ready for Business recovery grant for small businesses with a focus on LGBTQ-, BIPOC-, and women-owned businesses. She is passionate about small business and previously ran her family's small business and served as a small business banker. She lives with her wife of 24 years in Snohomish County, but is deeply rooted with her decades of work in Seattle.*		
Authorizing Signature (original signature): T. Mosqueda **Date Signed (appointed): 1/7/21**	**Appointing Signatory:** *Teresa Mosqueda* *Seattle City Councilmember, Position 8* *c*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

ILONA **LOHREY**

Work well in a team and independently, great attention to detail and able to prioritize tasks, ability to focus and excel under time constraints, self-motivated, enjoy a fast-paced environment, ability to connect with internal and external constituents at any level.

EXPERIENCE

JANUARY 2016 - PRESENT

VP OF MEMBERSHIP & PROGRAMS, GSBA, SEATTLE, WA, GSBA, SEATTLE, WA

As part of the GSBA leadership team, my responsibilities include contributing to the creation of the strategic plan for our organization, staffing needs, continued assessment of the organization's membership and program model. Managing a team of four to ensure GSBA's vision and mission are reflected within our membership and programs. Overseeing membership campaigns, member feedback and data, identifying revenue streams through corporate and government grants, sponsors and programs. Measure and analyze member engagement, identify shortcomings and create plan to address needs with our staff. Partnering with other LGBTQ chambers across the US, LGBTQ and allied community organizations, government agencies and corporations to identify business needs in the LGBTQ and other minority communities to provide resources and business development opportunities. Strengthen our partnerships with the City of Seattle, Snohomish County and King County have been a priority over the past two years to ensure our voices are heard. Our work with the Seattle OED to provide direct service to business owners who have SBA loan questions, working with Seattle OLS on labor standards training for small and micro businesses, participating in annual King County Executive's Minority Business Awards, and working with Washington State's L&I on educating businesses across the state are a few examples of our work with government agencies.

FEBRUARY 2009 – SEPTEMBER 2013

CEO, RBH GMBH, MUNICH, GERMANY

Managed a successful family business with approximately 1,400 employees located throughout Germany. Negotiated contracts for industrial cleaning services and building restoration to corporate businesses, such as hotels, municipalities, malls and office buildings in Germany. Lead the company through a corporate restructure and increased customer base and sales volume to $26MM. Sold the family business in 2013 and stayed on as a consultant to ensure a smooth transition for employees, customers and vendors until the end of September 2013 before returning stateside to the U.S.A.

MARCH 2002 – FEBRUARY 2009

BUSINESS BANKING GROUP MANAGER, WELLS FARGO BANK, SEATTLE, WA

Lead a business Banking group team of 8 Relationship Managers, 3 Credit Analysts and 6 Business Associates on the Seattle Metro BBG Team to service the commercial banking needs of businesses with annual revenues of $2MM - $35MM in the Greater Seattle area. Managed the

team portfolio aggregate direct exposure of $370MM, deposits of $980MM, and revenue generation of $5MM.

EDUCATION

JUNE 2006
RMI PROGRAM, COLLEGE OF BUSINESS AND ECONOMICS, MINNEAPOLIS, MN

JUNE 1994
BUSINESS & MANAGEMENT, LUDWIG-MAXIMILIAN-UNIVERSITY, MUNICH, GERMANY

SKILLS

- Successful team manager
- Connecter/convener in the business community
- Excellent organizational skills
- Ability to always find the positive

ACTIVITIES

Currently serving on the Governance Board at Cocoon House, a nonprofit organization serving homeless youth in Snohomish County.
Currently working on my Nonprofit Management Certificate, Everett Community College
2019 National Supplier Diversity Champion, NGLCC
2008 Mentor and Board Member at Seattle Education Access
2003-2007 Star Manager at Wells Fargo Bank

Labor Standards Advisory Commission

15 Members: Pursuant to *Ord. 124643, all* members subject to City Council confirmation, *2*-year terms:

- *7* City Council-appointed
- *7* Mayor-appointed
- *1* Other Appointing Authority-appointed (specify): Commission-appointed

Roster:

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			8.	Commissioner	Artie M. Nosrati	5/1/20	4/30/22	2	City Council
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1	F	3	14.	Commissioner	Jeanie Chunn	5/1/20	4/30/22	1	City Council
			15.	Commissioner	Vacant	5/1/19	4/30/21		Commission

SELF-IDENTIFIED DIVERSITY CHART

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Mayor		2											
Council		4			1					3			
Other													
Total		6			1					3			

Key:

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RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01762, **Version:** 1

Reappointment of Artie M. Nosrati as member, Labor Standards Advisory Commission, for a term to April 30, 2022.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Artie M. Nosrati*		
Board/Commission Name: *Labor Standards Advisory Commission*	**Position Title:** *Member, Position 8*	
☐ **Appointment** ***OR*** ☒ **Reappointment**	**City Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☒ City Council ☐ Mayor ☐ Other: *Fill in appointing authority*	**Term of Position: *** 5/1/2020 **to** 4/30/2022 ☐ *Serving remaining term of a vacant position*	
Residential Neighborhood: *Othello*	**Zip Code:** *98118*	**Contact Phone No.*:*** [redacted]
Background: *Artie Nosrati is the Field Director at Working Washington. Artie has organized workers in many industries including fast food, airport, and home healthcare. He has worked on campaigns including fast food strikes for Seattle $15, Seatac Proposition 1 ($15 for airport workers), Secure Scheduling, multiple corporate accountability campaigns, and other causes for economic justice. Artie's most useful experience, however, is growing up with a single mother struggling on minimum wage and limited social services, and working low-wage jobs himself for many years. Artie studied English/Creative Writing at the University of Wisconsin - Milwaukee (the other, other UW). While he did not pursue a writing career, he did end up in Seattle in 2011 after a Kerouac-esque road trip.*		
Authorizing Signature (original signature): T. Mosqueda **Date Signed (appointed): 1/11/2021**	**Appointing Signatory:** *Teresa Mosqueda* *Seattle City Councilmember, Position 8*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Artie M. Nosrati

[redacted]

Summary

I am passionate about workers' issues and progressive policies that comes from my own first-hand experience growing up in poverty. I have experience leading high profile campaigns, strong communication skills, and value evidence-based decision making.

Skills

- **Verbal Communication:** Years of direct organizing, communicating with workers and members of the public
- **Labor laws and policy:** participated in rulemaking for multiple labor laws including the Seattle Secure Scheduling Ordinance and I-1433.
- **Writing:** Have produced several professional writing pieces for various campaigns including grant proposals, reports, and messaging documents. Co-created and facilitated an undergraduate writing group, critiquing writing and organizing public readings.
- **Staff Leadership:** Trained and managed multiple staff, providing ongoing development and guidance
- **Action planning and logistics:** Coordinated and participated in a number of public actions, planning and logistics, ranging from worker strikes to civil disobedience.
- **Computer Basics:** competent with Word, Excel, and other office programs. Frequently create spreadsheets, flyers, and other materials for various campaigns.

Experience

2017 - present

Field Director, Working Washington
Managed staff on multiple campaigns in Seattle and statewide including health and safety in the workplace in Yakima, and Seattle domestic workers campaign. In addition, provided strategic planning, policy guidance, and coalition building on multiple campaigns.

2015- 2017

Field Manager, *Working Washington*
Managed a team of organizers on multiple campaigns including Secure Scheduling in Seattle, and statewide minimum wage. Participated in planning and executing direct worker actions.

2012 - 2015

Senior Organizer, SEIU 775
Organized workers in multiple industries including home healthcare, airport, and fast food workers. Led other organizers on teams for campaigns including Seatac Proposition 1 and Seattle fast food strikes.

2011 - 2012

Organizer, Working Washington

Organized community members and workers for economic justice issues including corporate accountability and shifting public policy to create jobs instead of cuts to social services.

2007 - 2010

SPARK Early Literacy Tutor, Boys and Girls Club/Americorps
Tutored K-3rd grade students with below-grade-level reading and writing abilities 1-on-1 during the school day. This program was jointly funded and operated through the Boys and Girls Club and Americorps and functioned as two terms of Americorps.

2004 - 2009

Sales Associate/Truck Unload, *Kohl's Department Store*
Unloaded truck, stocked shelves, and worked in various departments with tasks including merchandising and customer service.

2001 - 2004

Clerk, *Pick 'N' Save Grocery Store*

Bagged groceries and staffed multiple departments.

EDUCATION

2007-2010, 2016-2017 — BA – English/Creative Writing, *University of Wisconsin - Milwaukee*

Labor Standards Advisory Commission

15 Members: Pursuant to *Ord. 124643, all* members subject to City Council confirmation, *2*-year terms:

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Roster:

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SELF-IDENTIFIED DIVERSITY CHART

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RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01763, **Version:** 1

Reappointment of Samantha Grad as member, Labor Standards Advisory Commission, for a term to April 30, 2022.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Samantha Grad*		
Board/Commission Name: *Labor Standards Advisory Commission*		**Position Title:** *Member, Position 8*
☐ **Appointment** ***OR*** ☒ **Reappointment**	**City Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☒ City Council ☐ Mayor ☐ Other: *Fill in appointing authority*	**Term of Position: *** 5/1/2020 **to** 4/30/2022 ☐ *Serving remaining term of a vacant position*	
Residential Neighborhood: *West Seattle*	**Zip Code:** *98106*	**Contact Phone No.*:*** [redacted]
Background: *Samantha Grad is the Political and Legislative Director for UFCW21, the largest local union in Washington State, representing over 10,000 workers who live or work in Seattle in grocery, retail, healthcare, cannabis and other industry jobs (and over 46,000 workers statewide). Samantha worked on policy, research, and field mobilization for the Seattle Secure Scheduling and the Statewide effort for Paid Sick and Safe Leave and a higher Minimum Wage. She also has organized workers in various industries throughout Washington State for the past 8 years. Samantha enjoys rulemaking, romantic comedies and long walks on Alki Beach with her puppy, Dwayne 'the Rock' Johnson.*		
Authorizing Signature (original signature): T. Mosqueda **Date Signed (appointed):** **1/7/2021**	**Appointing Signatory:** *Teresa Mosqueda* *Seattle City Councilmember, Position 8*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Samantha Grad

WORK EXPERIENCE

Political and Legislative Organizer — Seattle, WA
UFCW 21 — **2015-Present**

- Educate and engage members in the political work of UFCW 21 with a strong emphasis on increasing both voter turnout amongst the membership and member activism in the legislative process.
- Lead public policy and rulemaking efforts around issue areas such as Paid Sick and Safe Leave, Paid Family and Medical Leave, Safe Staffing for health care workers, and Secure Scheduling.
- Assist with the fundraising drive to enroll members in the union's Political Action Fund.
- Outreach between members, coalition partners, community allies, and elected officials to further policy priorities at the City and State levels.

Field Director — Seattle, WA
Raise Up Washington — **2016**

- Oversaw campaign's field committee comprised of local labor, faith, and community partners.
- Assist in the design and the implementation of a statewide signature-gathering plan.
- Spearheaded the campaign's gathering plan for the Democratic caucuses resulting in over 30,000 signatures collected in one week.
- Draft and execute campaign's field plan for voter contact and Get Out The Vote efforts, managing seven organizers and focusing on ten targeted LDs and counties across the state.

Regional Field Director — Seattle, WA
Organizing for Washington — **2014**

- Hired, trained and managed a staff comprised of nine organizers in five separate offices across Washington State.
- Assisted with the operational and resource distribution aspects of the campaign, including the scouting and opening of offices around the state.
- Oversaw the implementation of statewide field plan in five key swing legislative districts across three counties, including South King County.
- Helped develop all training and messaging materials used in all voter outreach across the state.
- Leveraged support with community allies and elected officials to engage them in our efforts through the hosting of events and recruiting of volunteers from their networks.

Organizer — Seattle, WA
Service Employees International Union — **2013-2014**

- Targeted potential membership and developed leadership within new growth areas.
- Comprehended member concerns and identified effective solutions that could be implemented by leaders.
- Assisted in member mobilization efforts related to contract bargaining and broader social issues, including the $15 for Seatac race.

BOARDS

Paid Family and Medical Leave Advisory Board	WA State Employment Security Division	Present
WISHA Advisory Committee	WA State Dept. of Labor and Industries	Present
Progressive Revenue Taskforce	City of Seattle	2018

EDUCATION

Master's in Public Administration — Seattle University, Seattle, WA — 2017

- Developed a plan for the implementation of a statewide paid sick and safe leave program.
- Completed a capstone project focused on the framework of a paid family and medical leave insurance program in Washington State.

Bachelor of Science in Community Development — Portland State University, Portland, OR — 2011

- Minor in Communication Studies.
- Developed and implemented community project with a Section 8 NGO to provide assistance to residents to keep them on track for housing stability.
- Completed a thesis project working with low-income children helping to build strong foundations for successful school performance.

Labor Standards Advisory Commission

15 Members: Pursuant to *Ord. 124643, all* members subject to City Council confirmation, *2*-year terms:

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Roster:

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SELF-IDENTIFIED DIVERSITY CHART

	Male (1)	Female (2)	Transgender (3)	NB/ O/ U (4)	Asian (5)	Black/ African American (6)	Hispanic/ Latino (7)	American Indian/ Alaska Native (8)	Other (9)	Caucasian/ Non-Hispanic	Pacific Islander	Middle Eastern	Multiracial
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RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

File #: CB 119992, **Version:** 1

CITY OF SEATTLE

ORDINANCE _____

COUNCIL BILL _____

AN ORDINANCE relating to Seattle's construction codes; adopting the Seattle Boiler Code, Building Code, Electrical Code, Existing Building Code, Fuel Gas Code, Mechanical Code, Plumbing Code, and Residential Code by reference, amending certain chapters of those codes, and adopting new chapters for those codes; correcting references to those codes in the Seattle Municipal Code; making technical corrections; adding a new Chapter 22.101 to the Seattle Municipal Code; amending the title of Subtitle I of Title 22, Sections 5.73.020, 6.410.070, 6.420.030, 22.170.010, 22.170.050, 22.206.090, 22.206.130, 22.206.160, 22.208.020, 22.502.016, 22.801.030, 25.09.100, 25.09.110, 25.09.120, 25.09.220, and 25.09.520 of the Seattle Municipal Code; repealing Chapters 22.100 and 22.110 and Subtitles IA, III, IV, IVA, and IVB of Title 22 of the Seattle Municipal Code; and repealing ordinances or sections of the following ordinances that adopted or amended older editions of construction codes: 117723, 118654, 119478, 121865, 125156, 125157, 125158, 125160, 125161, 125162, 125337, 125408, 125409, 125410, and 125588.

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

ADOPTION OF NEW CONSTRUCTION CODES

Section 1. To the extent listed in Sections 22.101.010, 22.502.016, and 22.600.020 of the Seattle Municipal Code as amended by this ordinance, and with copies on file with the City Clerk in the Clerk Files listed in those sections, the following codes are adopted by reference, with additional chapters and amendments to those codes contained in the listed attachments to this ordinance:

Code adopted by reference	Contained/amended in
2018 Seattle Boiler and Pressure Vessel Code	Attachment A
2018 International Building Code	Attachment B
2020 National Electrical Code	Attachment C
2018 International Existing Building Code	Attachment D
2018 International Fuel Gas Code	Attachment E
2018 International Mechanical Code	Attachment F
Chapter 51-56 WAC (Uniform Plumbing Code)	Attachment G
2018 International Residential Code	Attachment H

Section 2. The title of Subtitle I of Title 22 of the Seattle Municipal Code, last amended by Ordinance 125410, is amended as follows:

Subtitle I ((~~Building Code~~)) <u>Construction Codes</u>

Section 3. A new Chapter 22.101 is added to Subtitle I of the Seattle Municipal Code as follows:

CHAPTER 22.101 ADOPTION OF CONSTRUCTION CODES

22.101.010 List of construction codes

Table A for 22.101.010 lists various adopted Seattle editions of construction codes. For each base code that has been adopted by reference, a copy is available in the City Clerk's Office under the listed Clerk File number. Each code consists of the listed portions of the base code, any additional chapters listed as adopted by ordinance, and amendments adopted by ordinance.

Table A for 22.101.010
Construction codes adopted by reference

Name	Base code	Additional chapters	Clerk File
Seattle Boiler and Pressure Vessel Code	Attachment A to this ordinance		
Seattle Building Code	2018 International Building Code, Chapters 2 through 29 and 31 through 35	Chapters 1 and 30, in Attachment B to this ordinance	321854
Seattle Electrical Code	2020 National Electrical Code and selected portions of chapter 296-46B WAC	Article 80, in Attachment C to this ordinance	321855
Seattle Existing Building Code	2018 International Existing Building Code, Chapters 2 through 11, 13, 15, and 16 and Appendix A	Chapter 1, in Attachment D to this ordinance	321856
Seattle Fuel Gas Code	2018 International Fuel Gas Code, Chapters 2 through 8 and Appendices A through D	Chapter 1, in Attachment E to this ordinance	321857
Seattle Mechanical Code	2018 International Mechanical Code, Chapters 2 through 9 and 11 through 15 and Appendices A and B	Chapter 1, in Attachment F to this ordinance	321858

Seattle Residential Code	2018 International Residential Code, Chapters 2 through 10, 12 through 24, 29, and 44 and Appendices F, Q, and T	Chapter 1, in Attachment H to this ordinance	321860

Section 4. Section 22.502.016 of the Seattle Municipal Code, last amended by Ordinance 125157, is amended as follows:

22.502.016 Adoption of ((~~2015 Plumbing Code and Local Amendments~~)) Seattle Plumbing Code

The Seattle Plumbing Code consists of: (1) all of chapter 51-56 of the Washington Administrative Code (WAC) in effect on July 1, ((~~2016~~)) 2020, except Sections 51-56-008 and 51-56-0100; (2) amendments and additions to chapter 51-56 WAC adopted by the City Council by ordinance; and (3) Chapter 1, which is composed of all local provisions. One copy of chapter 51-56 of the Washington Administrative Code in effect on July 1, ((~~2016~~)) 2020, is filed with the City Clerk in Clerk File ((~~319949~~)) 321859.

REPEAL OF OLD CONSTRUCTION CODES AND TRANSITION PROVISIONS

Section 5. The following ordinances or sections of ordinances, either adopting or amending older editions of construction codes, are repealed:

A. Ordinances 117723, 118654, 119478, 121865, and 125337 (relating to the Seattle Boiler and Pressure Vessel Code);

B. Sections 2 through 28 of Ordinance 125161, Sections 1 through 3 of Ordinance 125409, Section 1 of Ordinance 125410, and Section 1 of Ordinance 125588 (relating to the Seattle Building Code);

C. Sections 3 through 46 of Ordinance 125408 (relating to the Seattle Electrical Code);

D. Sections 2 through 16 of Ordinance 125158 and Section 2 of Ordinance 125410 (relating to the Seattle Existing Building Code);

E. Sections 2 through 9 of Ordinance 125156 (relating to the Seattle Fuel Gas Code);

F. Sections 2 through 15 of Ordinance 125162 and Section 4 of Ordinance 125410 (relating to the Seattle Mechanical Code);

G. Sections 2 through 8 of Ordinance 125157 (relating to the Seattle Plumbing Code); and

H. Sections 2 through 25 of Ordinance 125160 and Section 3 of Ordinance 125410 (relating to the Seattle Residential Code).

Section 6. Beginning on the effective date of this ordinance and ending on March 15, 2021, permit applicants who submit a valid and fully complete building permit application during that period may elect to have the application reviewed under the provisions of one or more codes listed in Section 5 of this ordinance rather than the provisions of codes adopted in this ordinance.

SEATTLE MUNICIPAL CODE CLEANUP AND CORRECTIONS

Section 7. Section 5.73.020 of the Seattle Municipal Code, last amended by Ordinance 125932, is amended as follows:

5.73.020 Definitions

* * *

"Bedroom" means a habitable room in a dwelling unit that meets the following criteria: (1) gross floor area equals at least 70 square feet; (2) wall dimensions equal at least 7 feet; (3) natural lighting is provided through an exterior opening in accordance with Section ((~~1205.2.2~~)) 1204.2.2 of the Seattle Building Code, or through an opening to an adjoining room in accordance with Section ((~~1205.2.1~~)) 1204.2.1 of the Seattle Building Code; (4) natural ventilation is provided through an exterior opening in accordance with Section ((~~1203.5.1~~)) 1202.5.1 of the Seattle Building Code, or through an opening to an adjoining room in accordance with Section ((~~1203.5.1.1~~)) 1202.5.1.1 of the Seattle Building Code, or through an opening below grade in accordance with Section ((~~1203.5.1.2~~)) 1202.5.1.2 of the Seattle Building Code; and (5) the habitable room is completely separated from other portions of the dwelling unit by walls and one or more exit access doorways, consistent with Chapter 2 of the Seattle Building Code.

* * *

Section 8. Section 6.410.070 of the Seattle Municipal Code, enacted by Ordinance 122109, is amended

as follows:

6.410.070 License classifications ((~~.~~))

* * *

D. *Refrigeration* ((~~*Operators*~~)) *Operator's Licenses*. A refrigeration ((~~operators~~)) operator's license is required except as provided by this chapter for all persons who operate and conduct maintenance of refrigeration and air conditioning systems that require annual certification in accordance with Section ((~~122~~)) 119 of the Seattle Mechanical Code.

* * *

Section 9. Section 6.420.030 of the Seattle Municipal Code, last amended by Ordinance 124919, is amended as follows:

6.420.030 Definitions ((~~.~~))

* * *

"Seattle Boiler Code" is the Seattle Boiler and Pressure Vessel Code, (((~~Title 22 Subtitle IVA of the Seattle Municipal Code~~))) as listed in Section 22.101.010.

Section 10. Chapter 22.100 of the Seattle Municipal Code, last amended by Ordinance 125410, is repealed:

((~~CHAPTER 22.100 ADOPTION OF BUILDING CODE AND ADMINISTRATIVE AMENDMENTS~~

~~Subchapter I Documents Adopted~~

~~22.100.010 Adoption of the Seattle Building Code~~

~~The Seattle Building Code is adopted and consists of: 1) Chapters 2 through 29, Chapters 31 through 33, and Chapter 35 of the 2015 edition of the International Building Code as amended by ordinance; and 2) Chapters 1 and 30 as adopted by the ordinance introduced as Council Bill 118781. One copy of the 2015 International Building Code is filed with the City Clerk in Clerk File 319954.~~))

Section 11. Chapter 22.110 of the Seattle Municipal Code, last amended by Ordinance 125158, is

repealed:

((~~Chapter 22.110 INTERNATIONAL EXISTING BUILDING CODE~~

~~22.110.010 Adoption of International Existing Building Code~~

~~The Seattle Existing Building Code consists of: (1) the following portions of the 2015 edition of the International Existing Building Code published by the International Code Council: Chapters 2 through 5, Chapters 7 through 11, Chapters 14 through 16, Chapter A1, Chapter A3, Chapter A4, and Chapter A6; (2) the amendments and additions to the 2015 International Existing Building Code adopted by City Council by ordinance; and (3) Chapter 1 adopted by City Council by ordinance. One copy of the 2015 International Existing Building Code is filed with the City Clerk in C.F. 319951.~~))

Section 12. Subtitle IA of Title 22 of the Seattle Municipal Code, last amended by Ordinance 125410, is repealed:

((~~Subtitle IA Residential Code~~

~~CHAPTER 22.150 ADOPTION OF RESIDENTIAL CODE AND ADMINISTRATIVE AMENDMENTS~~

~~22.150.010 Adoption of Seattle Residential Code~~

~~The Seattle Residential Code is adopted and consists of: 1) Chapters 2 through 10, Chapters 12 through 24, Section P2904, Chapter 44, Appendices F and U of the 2015 edition of the International Residential Code as amended by ordinance, and 2) Chapter 1 as adopted in Section 2 of the ordinance introduced as Council Bill 118780. One copy of the 2015 International Residential Code is filed with the City Clerk in Clerk File 319950.~~

))

Section 13. Section 22.170.010 of the Seattle Municipal Code, enacted by Ordinance 123107, is amended as follows:

22.170.010 Title

This subtitle shall be known as the "Seattle Grading Code" or "Grading Code" and may be cited as either. It is referred to in this chapter as "this code." ((~~.~~)) References in the Seattle Building Code to the "Stormwater,

Grading and Drainage Control Code" ((~~,"~~)) shall be construed to include a reference to this code.

Section 14. Section 22.170.050 of the Seattle Municipal Code, last amended by Ordinance 125248, is amended as follows:

22.170.050 Definitions

* * *

"Building permit" means a document issued by the Seattle Department of Construction and Inspections giving permission for construction or other specified activity in accordance with the Seattle Building Code ((~~(Chapter 22.100)~~)) or the Seattle Residential Code. ((~~(Chapter 22.150).~~))

* * *

Section 15. Section 22.206.090 of the Seattle Municipal Code, last amended by Ordinance 125343, is amended as follows:

22.206.090 Heating

* * *

B. ((~~heating~~)) Heating devices. All heating devices and appliances, including but not limited to furnaces, fireplaces, electric baseboard heaters, and water heaters, shall be of an approved type, in good and safe working order, and shall meet all installation and safety codes. Approved, unvented portable oil-fueled heaters may be used as a supplemental heat source provided that such heaters shall not be located in any ((~~sleeping room or bathroom~~)) prohibited location, as provided by ((~~Chapter 22.400,~~)) Section 303.3 of the Mechanical Code. Ventilation for rooms and areas containing fuel-burning appliances shall be adequate for proper combustion.

Section 16. Section 22.206.130 of the Seattle Municipal Code, last amended by Ordinance 125603, is amended as follows:

22.206.130 Requirements

* * *

C. Stairway enclosures

1. The standards for stairway enclosures are as follows:

a. The walls of all portions of a stairway enclosure shall be at least one hour fire-resistive construction. Materials fastened to walls or floors of stairway enclosures shall comply with ((~~the 2015~~)) Seattle Building Code Section 806; provided, that:

i. Existing partitions forming part of a stairway enclosure shall be permitted in lieu of one-hour fire-resistive construction if they are constructed of lath and plaster that is not cracked, loose, or broken; or

ii. Existing wainscoting and other decorative woodwork that was lawful at the time of installation is permitted if it is coated with an approved fire-retardant.

b. Each opening onto a stairway enclosure shall be protected by a self-closing fire door and latching assembly providing fire-resistance equivalent to that provided by a solid wood door and assembly at least 1-3/4 inches thick.

2. Stairway enclosures need not meet the above standards if:

a. A lawfully installed automatic fire-extinguishing system is provided for all corridors, stairs, and common areas within the building;

b. The stairway enclosure connects to only two floors and is not connected to corridors or stairways serving other floors; or

c. The stairway enclosure is in a dwelling unit.

* * *

G. Enclosure of vertical openings

1. Elevator shafts and other vertical openings shall be protected with construction as required for stairway enclosures in subsection 22.206.130.C.1 or by fixed wire-glass set in steel frames, or by assemblies that comply with Chapter 7 of the ((~~2015~~)) Seattle Building Code.

2. Doors on vertical openings shall be of solid wood at least 1-3/8 inches thick or shall provide

equivalent fire resistance.

H. Separation of occupancies. Occupancy separations shall be provided as specified in Section 508 and Table 508.4 of the ((~~2015~~)) Seattle Building Code.

* * *

Section 17. Section 22.206.160 of the Seattle Municipal Code, last amended by Ordinance 126075, is amended as follows:

22.206.160 Duties of owners

A. It shall be the duty of all owners, regardless of any lease provision or other agreement that purports to transfer the owner's responsibilities hereunder to an operator, manager, or tenant, to:

1. Remove all garbage, rubbish, and other debris from the premises;

2. Secure any building which became vacant against unauthorized entry as required by Section 22.206.200;

3. Exterminate insects, rodents, and other pests which are a menace to public health, safety, or welfare. Compliance with the Director's Rule governing the extermination of pests shall be deemed compliance with this subsection 22.206.160.A.3;

4. Remove from the building or the premises any article, substance, or material imminently hazardous to the health, safety, or general welfare of the occupants or the public, or which may substantially contribute to or cause deterioration of the building to such an extent that it may become a threat to the health, safety, or general welfare of the occupants or the public;

5. Remove vegetation and debris as required by Section 10.52.030;

6. Lock or remove all doors and/or lids on furniture used for storage, appliances, and furnaces which are located outside an enclosed, locked building or structure;

7. Maintain the building and equipment in compliance with the minimum standards specified in Sections 22.206.010 through 22.206.140 and in a safe condition, except for maintenance duties specifically

imposed in Section 22.206.170 on the tenant of the building; provided that this subsection 22.206.160.A.7 shall not apply to owner-occupied dwelling units in which no rooms are rented to others;

8. Affix and maintain the street number to the building in a conspicuous place over or near the principal street entrance or entrances or in some other conspicuous place. This provision shall not be construed to require numbers on either appurtenant buildings or other buildings or structures where the Director finds that the numbering is not appropriate. Numbers shall be easily legible, in contrast with the surface upon which they are placed. Figures shall be no less than 2 inches high;

9. Maintain the building in compliance with ((~~the requirements of Section 3401.2 of~~)) the Seattle Existing Building Code;

10. Comply with any emergency order issued by the Seattle Department of Construction and Inspections;

11. Furnish tenants with keys for the required locks on their respective housing units and building entrance doors; and

12. Maintain electricity, water, and gas (if provided) service equipment for each dwelling unit in good working order.

* * *

Section 18. Section 22.208.020 of the Seattle Municipal Code, last amended by Ordinance 125399, is amended as follows:

22.208.020 Standards for demolition, repair, or vacation and closure

* * *

D. If the Director finds that any of the following conditions exist, the Director shall order that such conditions be eliminated and that the building be closed within a time specified:

1. The condition or conditions which cause the building or premises to be unsafe or unfit for human habitation create a hazard to the public health, safety, or welfare that would exist even if the building

were vacated and closed to entry; or

2. Building appendages, as defined in the Seattle Existing Building Code ((~~Section 3402.2~~)), are in a deteriorated condition or are otherwise unable to sustain the design loads specified; or

3. Part of the building or premises or equipment intended to assist in extinguishing a fire, to prevent the origin or spread of fire, or to safeguard life or property from fire is in an unsafe or unusable condition.

Section 19. Subtitle III of Title 22 of the Seattle Municipal Code, last amended by Ordinance 125408, is repealed:

((~~Subtitle III Electrical Code~~

~~CHAPTER 22.300 ADOPTION OF ELECTRICAL CODE~~

~~22.300.016 Adoption of the Electrical Code~~

~~The Seattle Electrical Code consists of portions of the *National Electrical Code*, 2017 edition; selected portions of the 2017 edition of *Washington Administrative Code* (WAC) Chapter 296-46B, copies of which are filed with the City Clerk in Clerk Files 320384 and 320385; amendments, including deletions and additions, to the 2017 National Electrical Code and the selected portions of WAC 296-46B; and Article 80, relating to administration, permitting, and enforcement, as adopted by the ordinance introduced as Council Bill 119069.~~))

Section 20. Subtitle IV of Title 22 of the Seattle Municipal Code, last amended by Ordinance 125162, is repealed:

((~~Subtitle IV Mechanical Code~~

~~CHAPTER 22.400 ADOPTION OF MECHANICAL CODE AND ADMINISTRATIVE AMENDMENTS~~

~~22.400.010 Adoption of International Mechanical Code and local amendments~~

~~The Seattle Mechanical Code consists of: (1) the following portions of the 2015 edition of the International Mechanical Code published by the International Code Council, as amended by the City Council by ordinance: Chapters 2 through 9, Chapters 11 through 16, and (2) Chapter 1 relating to administration, permitting, and~~

~~enforcement adopted by City Council ordinance. One copy of the 2015 International Mechanical Code is filed with the City Clerk in C.F. 319953.~~))

Section 21. Subtitle IVA of Title 22 of the Seattle Municipal Code, last amended by Ordinance 125156, is repealed:

((~~Subtitle IVA Fuel Gas Code~~

~~CHAPTER 22.420 ADOPTION OF FUEL GAS CODE AND ADMINISTRATIVE AMENDMENTS~~

~~22.420.010 Adoption of International Fuel Gas Code~~

~~The Seattle Fuel Gas Code consists of: (1) the following portions of the 2015 edition of the International Fuel Gas Code published by the International Code Council, as amended by City Council by ordinance: Chapters 2-8, together with the adopted amendments and additions, and (2) Chapter 1 relating to administration, permitting and enforcement adopted by City Council by ordinance. One copy of the 2015 International Fuel Gas Code is filed with the City Clerk in C.F. 319952.~~))

Section 22. Subtitle IVB of Title 22 of the Seattle Municipal Code, last amended by Ordinance 125337, is repealed:

((~~Subtitle IVB Seattle Boiler and Pressure Vessel Code~~

~~CHAPTER 22.450 ADOPTION OF SEATTLE BOILER AND PRESSURE VESSEL CODE~~

~~22.450.010 Adoption of Seattle Boiler and Pressure Vessel Code~~

~~The Seattle Boiler and Pressure Vessel Code is hereby adopted and by this reference made a part of this Subtitle IVB. Copies of the Seattle Boiler and Pressure Vessel Code, with amendments, are kept on file at the Seattle Department of Construction and Inspections and in the City Clerk's Office.~~))

Section 23. Section 22.801.030 of the Seattle Municipal Code, enacted by Ordinance 124919, is amended as follows:

22.801.030 "B"

* * *

"Building permit" means a document issued by the Seattle Department of Construction and Inspections authorizing construction or other specified activity in accordance with the Seattle Building Code (((~~Chapter 22.100~~))) or the Seattle Residential Code (((~~Chapter 22.150~~))).

* * *

Section 24. Section 25.09.100 of the Seattle Municipal Code, last amended by Ordinance 125248, is amended as follows:

25.09.100 Development standards for liquefaction-prone areas

A. The general development standards set out in Section 25.09.060 do not apply to liquefaction-prone areas.

B. Soils engineering studies may be required for development in liquefaction-prone areas to determine the physical properties of the surficial soils, especially the thickness of unconsolidated deposits, and their liquefaction potential, pursuant to ((~~Title 22, Subtitle I~~)) the Seattle Building Code and the Seattle Existing Building Code.

C. If it is determined that the site is prone to liquefaction, the Director may impose mitigation measures pursuant to ((~~Title 22, Subtitle I~~)) the Seattle Building Code and the Seattle Existing Building Code, in addition to other applicable codes or regulations pertaining to development in liquefaction-prone areas.

Section 25. Section 25.09.110 of the Seattle Municipal Code, last amended by Ordinance 125248, is amended as follows:

25.09.110 Development standards for peat settlement-prone areas

* * *

C. No development shall occur within a peat settlement-prone area below the annual high static groundwater level except to the minimum extent the Director deems necessary to allow the following:

1. Structural components required under ((~~Title 22, Subtitles I and IA~~)) the Seattle Building Code, Seattle Existing Building Code, and Seattle Residential Code;

2. Utility lines, including but not limited to drainage and sanitary side sewers and stormwater conveyance facilities, but excluding groundwater collection systems;

3. Geotechnical testing;

4. Maintenance and repair, and interior renovation and interior structural alteration of an existing structure if that activity, even though it might involve construction activity below the annual high static groundwater level, does not increase the extent of the structure below the annual high static groundwater level;

5. Aquatic habitat restoration;

6. Infiltration facilities or other development designed primarily to encourage recharge or infiltration of water to the groundwater;

7. Replacement of contaminated soils with other soils or fills when the applicant demonstrates to the satisfaction of the Director that the removal will not increase the likelihood of settlement on off-site parcels;

8. Public utility facilities designed to provide drinking water, control flooding, or protect against sanitary or combined sewer overflow when the applicant demonstrates to the satisfaction of the Director that the facilities have been designed to avoid or minimize to the maximum extent practicable impacts to the groundwater regime; or

9. Elevator pits necessary to meet accessibility standards required by City law.

* * *

K. Nothing in this Section 25.09.110, including but not limited to subsection 25.09.110.I, limits the authority of the Director to require additional studies or impose additional conditions to address project-related risks arising in peat settlement-prone areas pursuant to other applicable codes or regulations, including but not limited to ((~~Title 22, Subtitles I and IA~~)) the Seattle Building Code, Seattle Existing Building Code, and Seattle Residential Code.

Section 26. Section 25.09.120 of the Seattle Municipal Code, last amended by Ordinance 125248, is amended as follows:

25.09.120 Development standards for flood-prone areas

All development shall meet the applicable requirements of Chapter 25.06, ((~~Chapter 22.100, Chapter 22.150,~~)) Chapter 22.170, and Chapter 22.800, as well as the Seattle Building Code and Seattle Residential Code.

Section 27. Section 25.09.220 of the Seattle Municipal Code, last amended by Ordinance 125248, is amended as follows:

25.09.220 Development standards for abandoned landfills

A. Regulation of development on abandoned landfills. Development on abandoned landfills is subject to Seattle-King County Health Department requirements for the applicant to submit an excavation and development work plan, prepared by a licensed engineer with experience in landfill construction and/or management, and comply with other applicable requirements to prevent damage from methane gas buildup, subsidence, and earthquake-induced ground shaking, as contained in Chapter 22.170, ((~~Title 22, Subtitle I~~)) the Seattle Building Code, the Seattle Existing Building Code, and regulations pertaining to development on abandoned landfill sites. Technical studies shall be required to indicate whether these areas pose a threat to development on an abandoned landfill site.

B. Areas within 1,000 feet of methane-producing landfills. Areas within 1,000 feet of methane-producing landfills may be susceptible to accumulations of hazardous levels of methane gas in enclosed spaces. Methane barriers or appropriate ventilation may be required in these areas as specified in ((~~Title 22, Subtitle I~~)) the Seattle Building Code, the Seattle Existing Building Code, and Seattle-King County Health Department regulations.

C. All utility lines leaving an abandoned landfill shall be sealed to prevent the trench bedding from becoming a preferential pathway for gas migration.

Section 28. Section 25.09.520 of the Seattle Municipal Code, last amended by Ordinance 125248, is amended as follows:

25.09.520 Definitions

* * *

"Stabilize" means to possess permanent characteristics, either naturally or by manmade improvements, which can be shown to have sufficient resistance to forces normally expected to occur, and those forces that may occur as a result of the Seattle Building Code design earthquake ground motion.

* * *

SEVERABILITY AND EFFECTIVE DATE CLAUSES

Section 29. The provisions of this ordinance are declared to be separate and severable. The invalidity of any clause, sentence, paragraph, subdivision, section, or portion of this ordinance, or the invalidity of its application to any person or circumstance, does not affect the validity of the remainder of this ordinance or the validity of its application to other persons or circumstances.

Section 30. Section 5 of this ordinance shall take effect and be in force on March 15, 2021.

Section 31. This ordinance shall take effect and be in force 30 days after its approval by the Mayor, but if not approved and returned by the Mayor within ten days after presentation, it shall take effect as provided by Seattle Municipal Code Section 1.04.020.

Passed by the City Council the _____ day of _____, 2021, and signed by me in open session in authentication of its passage this _____ day of _____, 2021.

_____

President _____ of the City Council

Approved / returned unsigned / vetoed this _____ day of _____, 2021.

_____

Jenny A. Durkan, Mayor

Filed by me this _____ day of _____, 2021.

_____

Monica Martinez Simmons, City Clerk

(Seal)

Attachments:
Attachment A - 2020 Seattle Boiler and Pressure Vessel Code
Attachment B - Amendments to 2018 International Building Code
Attachment C - Amendments to 2020 National Electrical Code
Attachment D - Amendments to 2018 International Existing Building Code
Attachment E - Amendments to 2018 International Fuel Gas Code
Attachment F - Amendments to 2018 International Mechanical Code
Attachment G - Amendments to Chapter 51-56 WAC (2018 Uniform Plumbing Code)
Attachment H - Amendments to 2018 International Residential Code

2020 Seattle Boiler and Pressure Vessel Code

Section 1 – Administrative

1.1 Title. These regulations shall be known as the "Seattle Boiler and Pressure Vessel Code," may be cited as such and will be referred to herein as "this code."

1.2 Purpose. The purpose of this code is to provide minimum standards for the protection of public health, safety, and property by regulating and controlling the quality, location, and installation of boilers and pressure vessels, piping, and appurtenances. It is not intended to create or otherwise establish or designate any particular class or group of persons who will or should be especially protected or benefited by the terms of this code.

1.3 General.

1.3.1 Scope. This code applies to the construction, erection, installation, operation, inspection, repair and alteration, relocation, replacement, addition to, use or maintenance of all boilers and pressure vessels. The design and testing of equipment regulated by this code are subject to the approval of the code official.

1.3.2 Applicability of city laws. A boiler permit application shall be considered under the Seattle Boiler Code in effect on a date as provided below, or on a date as otherwise required by law.

A. Boiler code permit applications shall be considered under the codes in effect on the date used to determine the codes applicable to the building permit application in accordance with the Seattle Building Code Section 101.3 if any of Items 1 through 3 apply:

1. The boiler permit application is submitted as part of a building permit application;
2. The boiler permit application is for work directly associated with a building permit but is submitted separately from the building permit application; or
3. The boiler permit application is for initial tenant alterations submitted no later than 18 months after the date of the approved final inspection for the building, and is submitted before the expiration date of the building permit for the tenant alteration, as determined by Seattle Building Code Section 106.9.

B. Boiler permit applications, other than those subject to Item 1, shall be considered under the codes in effect on the date a complete boiler permit application is submitted that complies with all the requirements of Section 4.1, Permits Required.

1.3.3 Conflicts. Where, in any specific case, different sections of this code specify different materials, methods of construction, or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable.

1.3.4 Workmanship. All equipment, appurtenances, devices, and piping shall be installed in a workmanlike manner, in accordance with recognized engineering practice, and in conformity with the provisions and intent of this code.

1.4 Powers and duties of the code official

1.4.1 General.

A. Applications and permits. The code official shall receive applications, review construction documents, and issue permits for the erection and alteration, demolition, and moving of buildings and structures; inspect the premises for which such permits have been issued; and enforce compliance with provisions of this code.

B. Inspections. The code official shall make the required inspections or the code official shall have the authority to accept reports of inspection by approved agencies or individuals. Reports of such inspections shall be in writing and be certified by a responsible officer of such approved agency or by the responsible individual. The code official is authorized to engage such expert opinion as deemed necessary to report upon unusual technical issues that arise, subject to the approval of the appointing authority.

C. Notices and orders. The code official shall issue necessary notices or orders to ensure compliance with this code.

D. The code official shall keep official records of applications received, permits and certificates issued, fees collected, reports of inspections, and notices and orders issued. Such records shall be retained in the official records for the period required for retention of public records.

1.4.2 Designees. The code official may appoint such officers, inspectors, assistants, and employees, including the Chief Pressure Systems Inspector, as authorized from time to time. The code official may authorize such employees and other agents as may be necessary to carry out the functions of the code official.

1.4.3 Right of entry. With the consent of the owner or occupier of a building or premises, or pursuant to a lawfully issued warrant, the code official may enter a building or premises at any reasonable time to perform the duties imposed by the code.

1.4.4 Liability. Nothing in this code is intended to be nor shall be construed to create or form the basis for any liability on the part of the City, or its officers, employees, or agents, for any injury or damage resulting from 1) the failure of equipment to conform to the provisions of this code, or 2) any inspection, notice, order, certificate, permission or approval authorized or issued, or 3) the implementation or enforcement of this code, or 4) any action or inaction on the part of the City related in any manner to the enforcement of this code by its officers, employees, or agents. This code shall not be construed to relieve or lessen the responsibility of any person owning, operating, or controlling any equipment, building, or structure for any damages to persons or property caused by defects, nor shall the Seattle Department of Construction and Inspections or The City of Seattle be held to have assumed any such liability by reason of the inspections, permits, or certificates issued under this code.

1.4.5 Responsibility for Compliance. Compliance with the requirements of this code is the obligation of the owner of the building, structure, or premises, the duly authorized agent of the owner, or any other person responsible for the condition or work, not the obligation of the City or any of its officers, employees, or agents.

1.4.6 Cooperation of other officials and officers. The code official may request, and shall receive, so far as is required in the discharge of the code official's duties, the assistance and cooperation of other officials of The City of Seattle.

1.4.7 Rules of the code official. The code official has authority to interpret this code and to adopt and enforce rules and regulations supplemental to this code as may be necessary to clarify the application of this code. Such interpretations, rules, and regulations shall conform to the intent and purpose of this code. The code official shall promulgate, adopt, and issue rules in accordance with the procedures specified in Chapter 3.02 of the Administrative Code, Seattle Municipal Code.

1.5 Construction Codes Advisory Board.
1.5.1 General. A committee of the Construction Codes Advisory Board may examine proposed administrative rules and amendments relating to this code and related provisions of other codes and make recommendations to the code official and to the City Council for changes in this code. The committee will be called as needed by the Construction Codes Advisory Board.

1.6 Violations, enforcement, and penalties.
1.6.1 Violations. It is a violation of this code for anyone to perform the actions contained in items A-H of this section.
A. Work in violation of code. Install, erect, construct, enlarge, alter, repair, replace, remodel, move, improve, remove, convert or demolish, equip, occupy, use, or maintain any boiler or pressure vessel or auxiliary equipment or cause, allow, or direct the same to be done in the City, contrary to or in violation of any provision of this code.
B. Unapproved material or devices. Use any material or install any device, appliance, or equipment which does not comply with this code or which has not been approved by the code official.
C. Operating without a license. Have charge of, operate, or permit any person to have charge of, or operate, any boiler or steam engine regulated by this code without a license to do so as prescribed by SMC Chapter 6.420.
D. Posted notices. Remove, mutilate, destroy, or conceal any notice or order issued or posted by the code official pursuant to the provisions of this code, or any notice or order issued or posted by the code official in response to a natural disaster or other emergency.
E. Requesting inspections. Conduct work under a permit without requesting an inspection required by this code.
F. Encouraging violation of code. Knowingly aid, abet, counsel, encourage, hire, induce, or otherwise procure another to violate or fail to comply with this code;
G. Non-compliance with notice of violation. Failure to comply with a notice of violation by the date set by the code official in the notice.
H. Complying with orders of the code official. Fail to comply with any order issued by the code official, including but not limited to stop work orders, emergency orders, or hazard correction orders.

1.6.2 Notice of Violation. If, after investigation, the code official determines that standards or requirements of this code have been violated, or that orders or requirements have not been complied with, the code official may issue a notice of violation upon the owner, agent, or other person responsible for the action or condition.

A. Contents of notice of violation. The notice of violation shall state:

1. The standards or requirements violated;
2. What corrective action, if any, is necessary to comply; and
3. Set a reasonable date certain for compliance.

B. Serving notice of violation. The notice shall be served upon the owner, agent, or other responsible person by personal service or regular first class mail, addressed to the last known address of such person, or if no address is available after reasonable inquiry, the notice shall be posted in a conspicuous place on the premises. The notice may also be posted on the premises at any time. Nothing in this subsection limits or precludes any action or proceeding to enforce this code, and nothing in this section obligates or requires the code official to issue a notice of violation prior to the imposition of civil or criminal penalties.

C. Code official review. Any person affected by a notice of violation issued pursuant to this Section 1.6.2 may obtain a review of the notice by making a request in writing to the code official within 10 days after service of the notice. When the last day of the period computed is a Saturday, Sunday, or City holiday, the period runs until 5 p.m. of the next business day.

D. Review procedure. The review shall occur not less than 10 or more than 20 days after the request is received by the code official unless otherwise agreed to by the person requesting the review. Any person affected by the notice of violation may submit additional information to the code official. The review shall be made by a representative of the code official who will review any additional information that is submitted and the basis for issuance of the notice of violation. The reviewer may request clarification of the information received and perform a site visit.

E. Decision. After the review, the code official shall render one of the following four decisions:

1. Sustain the notice of violation;
2. Withdraw the notice of violation;
3. Amend the notice of violation; or
4. Continue the review of the notice of violation to a date certain.

F. Order. The code official shall issue an order containing the decision within 15 days after the review is completed and shall cause the order to be sent by regular first-class mail to the person or persons requesting the review, to any person on whom the stop work order was served, and to any other person who requested a copy before issuance of the order, addressed to their last known address.

1.6.3 Stop work orders. The code official may issue a stop work order whenever any work is being done without a permit, contrary to the provisions of this code, contrary to a permit issued by the code official, or in the event of dangerous or unsafe conditions related to equipment, construction, or demolition of boilers or pressure vessels.

A. Violation identified. The stop work order shall identify the violation or unsafe condition and may prohibit work or other activity on the site.

B. Serving the stop work order. The code official shall serve the stop work order by posting it on the premises in a conspicuous place at the site. If posting is not physically possible, the stop work order may be served by personal service or by regular first-class mail to the last known address of the person doing or causing the work to be done, the property owner, or the holder of a permit if the work is being stopped on a permit. For purposes of this section, service is complete at the time of posting or personal service or, if mailed, three days after the date of mailing. When the last day of the period so computed is a Saturday, Sunday, or City holiday, the period runs until 5 p.m. on the next business day.
C. Stop work order effective date. Stop work orders are effective when posted, or if posting is not physically possible, when one of the persons identified in Section 1.6.2(B) is served.
D. Work after stop work order. It is unlawful for any person to engage in work or to cause work to continue until authorization from the code official is received.
E. Administrative review of stop work orders. Any person aggrieved by a stop work order may obtain a review of the order by delivering to the code official a written request for review within two business days of the date of service of the stop work order.

1. Review procedure. The review shall occur within two business days after receipt by the code official of the request for review unless otherwise agreed by the person making the request. Any person affected by the stop work order may submit additional information to the code official for consideration as part of the review at any time prior to the review. The review will be made by the code official, who will review all additional information received and may also request a site visit.
2. Decision. After the review, the code official may:
    a. Sustain the stop work order;
    b. Withdraw the stop work order;
    c. Modify the stop work order; or
    d. Continue the review to a date certain.
3. Issuing order. The code official shall issue an order containing the decision within two business days after the review is completed and shall cause the order to be sent by regular first-class mail to the person or persons requesting the review, any person on whom the stop work order was served, and any other person who requested a copy before issuance of the order, addressed to their last known address.

1.6.4 Authority to disconnect utilities in emergencies. The code official has the authority to:
A. Disconnect fuel-gas utility service or energy supplied to a building, structure, premises, or equipment regulated by this code in cases of emergency when necessary to eliminate an immediate hazard to life or property.
B. Enter any building or premises to disconnect utility service. Whenever possible the code official shall notify the serving utility, owner, and occupant of the building, structure, or premises of the decision to disconnect prior to taking such action, and shall notify the serving utility, owner, and occupant of the building, structure, or premises in writing of such disconnection immediately after the disconnection.

1.6.5 Reconnection. Until the code official authorizes reconnection of equipment, it is a violation to:

1) Make connections from an energy, fuel, or power supply or supply energy or fuel to any equipment regulated by this code that is disconnected or ordered to be disconnected by the code official; and

2) Use the equipment ordered to be disconnected, until the code official authorizes the reconnection and use of such equipment.

1.6.6 Authority to condemn equipment. Whenever the code official determines that any equipment or portion thereof regulated by this code is hazardous to life, health, or property, the code official shall order in writing that such equipment be disconnected, removed, or restored to a safe or sanitary condition. The written notice shall fix a date certain for compliance with such order. It is a violation for any person to use or maintain defective equipment after receiving such notice. When any equipment or installation is to be disconnected, the code official shall give written notice of such disconnection and causes therefor within 24 hours to the serving utility, the owner, and the occupant of the building, structure, or premises. When any equipment is maintained in violation of this code, and in violation of a notice issued pursuant to the provisions of this section, the code official shall institute any appropriate action to prevent, restrain, correct, or abate the violation.

1.6.7 Emergency order. Whenever the code official finds that any equipment regulated by this code is so unsafe as to constitute an imminent hazard to life or limb, the code official may issue an emergency order. The emergency order may,

1) direct that the equipment be restored to a safe condition by a date certain;

2) require that the building, structure, or premises, or portion thereof, containing the equipment be vacated within a reasonable time to be specified in the order, or in the case of extreme danger, the order may specify immediate vacation of the building, structure, or premises, or portion thereof; or

3) authorize immediate disconnection of the utilities or energy source.

A. Service of emergency order. The emergency order shall be posted on the premises or personally served to the owner of the building or premises or any person responsible for the condition. The order shall specify the time for compliance.

B. Effect of emergency order. No person may occupy a building, structure, or premises, or portion thereof, after the date on which the building is required to be vacated until the building, structure, or premises, or portion thereof, is restored to a safe condition as required by the order and this code. It is a violation for any person to fail to comply with an emergency order issued by the code official. When any equipment is operated in violation of this code, or in violation of an order issued pursuant to the provisions of this section, the code official may begin an action to prevent, restrain, correct, or abate the violation.

1.6.8 Hazard correction order. Whenever the code official finds that unsafe equipment exists, the code official may issue a hazard correction order. The order shall:

1) state the conditions causing the equipment to be unsafe,

2) direct the owner or other persons responsible for the unsafe equipment to correct the condition, and

3) give a date certain for completing the required corrections. In lieu of correction, the owner may submit a report or analysis of the conditions to the code official establishing that the equipment is, in fact, safe. The code official may require that the report or analysis be prepared by a licensed engineer; the code official may accept the report as adequate or may reject the report as insufficient.

A. Service of hazard correction order. The order shall be served upon the owner, agent, or other responsible person by personal service or regular first-class mail addressed to the last known address of such person, or if no address is available after reasonable inquiry, the order may be posted in a conspicuous place on the premises. The order may also be posted on the premises if it is also being served by personal service or first-class mail.

B. Effect of hazard correction order. It is a violation for any person to fail to comply with a hazard correction order as specified in this subsection.

1.6.9 Recording. The code official may record a copy of any order or notice with the Department of Executive Services of King County.

1.6.10 Civil penalties. Any person violating or failing to comply with the provisions of this code is subject to a cumulative civil penalty in an amount not to exceed $500 per day for each violation from the date the violation occurs or begins until compliance is achieved. In cases where the code official has issued a notice of violation, the violation will be deemed to begin, for purposes of determining the number of days of violation, on the date compliance is required by the notice of violation.

A. Enforcement in Municipal Court. Civil actions to enforce Section 22.450.010 of the Seattle Municipal Code (SMC) shall be brought exclusively in Seattle Municipal Court, except as otherwise required by law or court rule. In any civil action for a penalty, the City has the burden of proving by a preponderance of the evidence that a violation exists or existed. The issuance of a notice of violation or of an order following review by the code official is not itself evidence that a violation exists.

B. Judicial review. Because civil actions to enforce Section 22.450.010 of the SMC must be brought exclusively in Seattle Municipal Court pursuant to subsection 1.6.10.A, orders of the code official, including notices of violation issued under this chapter, are not subject to judicial review pursuant to chapter 36.70C Revised Code of Washington (RCW), Judicial Review of Land Use Decisions.

C. Appeal to Superior Court. Final decisions of the Seattle Municipal Court on enforcement actions authorized by Section 22.450.010 of the SMC and this code may be appealed pursuant to the Rules for Appeal of Decisions of Courts of Limited Jurisdiction.

1.6.11 Alternative criminal penalty. Anyone who violates or fails to comply with any notice of violation or order issued by the code official pursuant to this code or who removes, mutilates, destroys, or conceals a notice or order issued or posted by the code official shall, upon conviction thereof, be punished by a fine of not more than $5,000 or by imprisonment for not more than 364 days, or by both fines and imprisonment for each separate violation. If the violation continues to exist, each day the violation or failure to comply is continued shall constitute a separate offense.

1.6.12 Additional Relief. The code official may seek legal or equitable relief to enjoin any acts or practices and abate any condition when necessary to achieve compliance.

1.6.13 Administrative review by the code official. Prior to issuance of the boiler or pressure vessel permit, applicants may request administrative review by the code official of decisions or actions pertaining to the administration and enforcement of this code. Requests shall be addressed to the code official.

1.6.14 Construction Codes Advisory Board (CCAB) Review. After completion of an administrative review by the code official, and prior to issuance of the boiler or pressure vessel permit, applicants may request a review of the code official's decisions or actions pertaining to the application and interpretation of this code by the Construction Codes Advisory Board. The review will be performed by three or more members of the Construction Codes Advisory Board, chosen by the board chair. The chair shall consider the subject of the review and members' expertise when selecting members to conduct a review. The decision of the CCAB committee is advisory only. The final decision is made by the code official.
Exception: Stop work orders, notices of violations and revocations of permits shall not be subject of a Construction Codes Advisory Board review.

1.7 Existing Installations.
1.7.1 Existing boilers and pressure vessels. Boilers and pressure vessels lawfully in existence at the time of the adoption of this code may continue in use at the location approved in the original permit. The systems may be maintained or repaired, converted to another type of fuel, or have components replaced if the use, maintenance, repair, conversion of fuel, or component replacement is done in accordance with the original code of construction and/or installation requirements when approved by the code official.

1.7.2 Maintenance of existing installations. All boilers and pressure vessels, materials and appurtenances, and parts, both existing and new, shall be maintained in proper operating condition in accordance with the original design and in a safe and hazard-free condition. All devices or safeguards required by the Seattle Boiler and Pressure Vessel Code shall be maintained in conformance with the code edition in effect when the system was installed, and boilers and pressure vessels shall be maintained in accordance with the manufacturer's instructions or nationally recognized standards. The owner or the owner's designated agent is responsible for maintenance of boilers and pressure vessels and auxiliary equipment. To determine compliance with this subsection, the code official may require a boiler or pressure vessel or equipment to be inspected or re-inspected.
Exception: The code official may modify the requirements of this section where all or a portion of the building is unoccupied.

1.7.3 Changes in existing building or occupancy. Existing boilers and pressure vessels that are a part of a building or structure housing a vessel undergoing a change in use or occupancy, as defined in the International Building Code, shall comply with all requirements of this code that

are applicable to the new use or occupancy. If the use of the boiler or pressure vessel changes, then a new permit may be required, and the equipment shall comply with all requirements of this code.

1.7.4 Landmarks. The code official may modify the specific requirements of this code as it applies to landmarks and require in lieu thereof alternate requirements that, in the opinion of the code official, will result in a reasonable degree of safety to the public and the occupants of those buildings.

1.8 Alternative materials, designs, and methods of construction. This code does not prevent the use of any material, alternative design, or method of construction not specifically allowed or prohibited by this code, provided the alternate is approved and its use is authorized by the code official. The code official may approve an alternative if the proposed alternative complies with the intent of this code and that the alternative, when considered together with other safety features of the building or other relevant circumstances, provides at least an equivalent level of strength, effectiveness, fire resistance, durability, sanitation, and safety. The code official may require that sufficient evidence or proof be submitted to reasonably substantiate any claims regarding the use or suitability of the alternative. Acceptance of a Construction Code Advisory Board recommendation may be considered sufficient evidence by the code official to approve the alternative material, design, or method of construction. The code official may, but is not required to, record the approval of alternatives and any relevant information in the files of the code official or on the approved permit plans.

1.9 Modifications. The code official may modify the requirements of this code for individual cases provided:

1) There are practical difficulties in complying with the requirements of this code;
2) The modification is in conformity with the intent and purpose of this code; and
3) The modification provides a reasonable level of strength, effectiveness, fire resistance, durability, sanitation, and safety when considered together with other safety features of the building or other relevant circumstances. The code official may, but is not required to, record the approval of modifications and any relevant information in the files of the code official or on the approved set of construction documents.

1.10 Tests. If there is insufficient evidence of compliance with the requirements of this code, or evidence that a material or method does not conform to the requirements of this code, the code official may require that tests, as proof of compliance, be made at no expense to the City. Test methods shall be those specified in this code or by other recognized test standards. If there are no recognized and accepted test methods for the proposed alternative or modification, the code official shall determine the test procedures. All tests shall be made by an agency approved by the code official. The agency shall provide a report of tests or examination results, and those results shall be retained by the code official for the period required for retention of public records.

Section 2 - Definitions

2.1 Scope. The following words and terms shall, for the purposes of this code, have the meanings given in this section.

2.2 Interchangeability. Words used in the present tense include the future; words in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural the singular.

2.3 Terms defined in other codes. Terms used but not defined in this code but defined in the *International Building Code*, *International Fire Code*, *Seattle Electrical Code*, *International Fuel Gas Code*, *Uniform Plumbing Code*, or the American Society of Mechanical Engineers (ASME) Standard CSD-1 Controls and Safety Devices for Automatically Fired Boilers shall be used. When a definition is found here and in ASME CSD-1, the definition given in this code shall govern.

2.4 Terms not defined. When a definition is not found below, the definitions of terms found in the codes and standards listed in Section 3.1 of this code shall govern.

"A" OCCUPANCIES are places of public assembly. Details can be found in Seattle Building Code Chapter 3.

ACCESSIBLE means having access to and includes the removal of an access panel, door, or similar obstruction designed for removal.

ACCESSIBLE, READILY means capable of being reached safely and quickly for operation, repair, or inspection without climbing over or removing obstacles, or resorting to the use of portable access equipment.

ALTERATION means a change in the item described on the original Manufacturer's Data Report which affects the pressure containing capability of the pressure-retaining item.

APPLIANCE means a device which utilizes fuel or other forms of energy to produce light, heat, power, refrigeration or air conditioning, including vented decorative appliances.

APPROVED means accepted by the code official.

APPROVED AGENCY means an agency approved by the code official that is regularly engaged in conducting tests, examinations, or furnishing inspection services.

ASME is the acronym for American Society of Mechanical Engineers.

ATTENDANT means the person in charge of the operation of a boiler or unfired pressure vessel.

AUTOMATIC CERTIFICATION PERMIT means a permit used to modify the licensed attendance requirements for a specific boiler. (See Steam Engineer and Boiler Fireman License Law, Seattle Municipal Code Chapter 6.420.)

"B" OCCUPANCIES are business uses, such as offices. Details can be found in Seattle Building Code Chapter 3.

BOILER means a closed vessel in which water is heated, steam is generated, steam is superheated, or any combination thereof, under pressure or vacuum by the direct application of heat, including fired units for heating or vaporizing liquids other than water where these systems are complete within themselves.

BOILER ROOM means any room primarily used to house a boiler.

BOILER, CERTIFIED AS AUTOMATIC means a boiler that complies with Section 4.25 of this code, has an automatic certification permit that passed final inspection and is used to modify the licensed attendant requirements for a specific boiler. (See "Steam Engineer and Boiler Fireman License Law", Seattle Municipal Code Chapter 6.420).

BOILER, CERTIFIED AS MONITORED means a boiler that complies with Section 4.26 of this code and is used to modify the licensed attendant requirements for a specific boiler. (See "Steam Engineer and Boiler Fireman License Law", Seattle Municipal Code Chapter 6.420.)

BOILER, HOT-WATER SUPPLY means a listed potable water boiler, exceeding the limitations of a potable hot water heater, but that does not exceed a pressure of 160 psi (1100 kPa) or a temperature of 250 degrees F (121 degrees C), that provides hot water to be used externally to itself.

BOILER, LOW-PRESSURE HOT-WATER-HEATING means a boiler that circulates hot water for heating purposes at pressures not exceeding 160 pounds per square inch (1100 kPa) and at temperatures not exceeding 250 degrees F (121 degrees C), and the water is then typically returned to the boiler.

BOILER, LOW-PRESSURE STEAM-HEATING means a boiler furnishing steam for heating purposes at pressures not exceeding 15 pounds per square inch (103 kPa).

BOILER, POWER HOT-WATER (HIGH-TEMPERATURE WATER BOILER) means a boiler used for heating water or liquid to a pressure exceeding 160 psi (1100 kPa) or to a temperature exceeding 250 degrees F (121 degrees C).

BOILER, POWER means a boiler that generates steam or vapor at pressures exceeding 15 psi.

BOILER, RENTAL means any type of boiler that is owned by an entity for the purpose of renting to other entities for temporary or long-term usage.

BOILER, USED means any boiler installed in Seattle that was in previous service.

BUILDING CODE means the Seattle Building Code.

BURNER means a device that conveys fuel and air or steam into the combustion chamber of a boiler to cause and maintain stable combustion.

CHIMNEY means a primarily vertical structure containing one or more flues, for the purpose of carrying gaseous products of combustion and air from a fuel-burning appliance to the outside atmosphere.

CODE OFFICIAL is the Director of the Seattle Department of Construction and Inspections and the Director's designees, which include the Chief Pressure Systems Inspector and other authorized representatives.

COMBUSTION AIR means the air necessary for complete combustion of a fuel, including theoretical air and excess air.

DEPARTMENT means the Seattle Department of Construction and Inspections.

DRAFT HOOD means a nonadjustable device built into an appliance or made a part of the vent connector from an appliance, which is designed to:

1) Provide for the ready escape of the flue gases in the event of no draft, backdraft or stoppage beyond the draft hood;
2) Prevent a backdraft from entering the appliance; and
3) Neutralize the effect of stack action of the chimney or gas vent upon the operation of the appliance.

DUCT means a tube or conduit for conveying air. The air passages of listed self-contained systems are not to be construed as air ducts.

"E" OCCUPANCIES are educational facilities. Details can be found in Seattle Building Code Chapter 3.

ELECTRICAL CODE is the Seattle Electrical Code.

EXTERNAL INSPECTION means an inspection of the outside and fireside of the boiler, including safety controls.
"F" OCCUPANCIES are factory and industrial uses. Details can be found in Seattle Building Code Chapter 3.
FIRE CODE is the Seattle Fire Code.
FUEL TRAIN means a series of valves, regulators, and controls, between the burner and the source of fuel, that regulates and controls the flow of fuel to the burner.
"H" OCCUPANCIES are high hazard uses. Details can be found in Seattle Building Code Chapter 3.
"I" OCCUPANCIES are medical and institutional facilities. Details can be found in Seattle Building Code Chapter 3.
INSPECTOR means any of the inspector types defined by this code, who examine internal and external boiler and pressure vessel parts and surfaces and who test the function of operating controls and safety devices for correct operation.
INSPECTOR, CHIEF means the chief pressure systems inspector appointed by the code official.
INSPECTOR, CITY means an inspector employed by the Department.
INSPECTOR, INSURANCE means an inspector employed by an authorized insurance company as defined in this code.
INSURANCE COMPANY, AUTHORIZED means an insurance company that has been authorized by the State of Washington to write and provide insurance coverage for loss of boilers or unfired pressure vessels.
INTERNAL INSPECTION means an inspection requiring that the water side of the boiler be looked at visually.
JACKETED STEAM KETTLE means a pressure vessel, with inner and outer walls, that is subject to steam pressure and is used to boil or heat liquids or to cook food.
LETHAL SUBSTANCE means a poisonous gas or liquid that in a very small amount is dangerous to life when inhaled or absorbed through the skin or membranes. It is the responsibility of the user or the user's designated agent to determine and declare if contents are lethal substances.
LANDMARK means a building or structure that is subject to a requirement to obtain a certificate of approval from the City Landmarks Preservation Board before altering or making significant changes to specific features or characteristics, that has been nominated for designation and the City Landmarks Preservation Board has not issued a determination regarding designation, that has been designated for preservation by the City Landmarks Preservation Board, that has been designated for preservation by the State of Washington, that has been listed or determined eligible to be listed in the National Register of Historic Places, or that is located in a landmark or special review district subject to a requirement to obtain a certificate of approval before making a change to the external appearance of a structure.
LICENSED OPERATOR means a person licensed to operate boilers in accordance with the Seattle Steam Engineer and Boiler Fireman License Law, SMC Chapter 6.420.
LISTED means that equipment, materials, products, or services are included in a list published by an organization acceptable to the code official. The listing organization provides an evaluation of products or services by performing periodic inspection during production of equipment or materials, or periodic evaluation of services. The resulting listing states either that the

equipment, material, product, or service meets identified standards, or was tested and found suitable for use in a specified manner.

"M" OCCUPANCIES are retail and wholesale facilities. Details can be found in Seattle Building Code Chapter 3.

MANUALLY OPERATED (FIRED) BOILER means a boiler that requires constant attendance by an operator with no duties other than the proper and safe operation of the boiler, its related equipment when the boiler is in operation.

PERSON means an individual, receiver, administrator, executor, assignee, trustee in bankruptcy, trust, estate, firm, partnership, joint venture, club, company, joint stock company, business trust, municipal corporation, political subdivision of the State of Washington, corporation, limited liability company, association, society, or any group of individuals acting as a unit, whether mutual, cooperative, fraternal, nonprofit, or otherwise, and the United States or any instrumentality thereof.

PILOT means a small burner that is used to light the main burner.

PILOT, CONTINUOUS (also known as constant burning pilot) means a pilot that burns without turndown during the entire time the boiler is in service, whether the main burner is firing or not.

PILOT, INTERMITTENT means a pilot that is automatically lighted each time there is a call for heat and burns during the entire period the main burner is firing.

PILOT, INTERRUPTED means a pilot that is automatically lighted each time there is a call for heat. The pilot fuel is cut off automatically once the main burner flame is ignited.

PRESSURE VESSEL means a closed unfired container under internal pressure.

PRESSURE VESSEL, USED means any pressure vessel that is installed in Seattle that was in service at a previous time.

PURGE means to blow air, fuel, water, or other foreign substances out of a container or confined space.

"R" OCCUPANCIES are residential facilities. Details can be found in Seattle Building Code Chapter 3.

REPAIR means the work necessary to restore pressure-retaining items to a safe and satisfactory operating condition.

REPAIR ORGANIZATION means an organization in possession of a valid "R" *Certificate of Authorization* issued by the National Board.

"S" OCCUPANCIES are storage facilities. Details can be found in Seattle Building Code Chapter 3.

"U" OCCUPANCIES are accessory utility facilities such as private garages and greenhouses. Details can be found in Seattle Building Code Chapter 3.

VENT means a pipe or other conduit composed of factory-made components, containing a passageway for conveying combustion products and air to the atmosphere, listed and labeled for use with a specific type or class of appliance.

VENT CONNECTOR means the pipe that connects an approved fuel-fired appliance to a vent.

WATER HEATER, COMBINATION means a potable hot water heater that is listed for the use of producing both space heat and potable hot water and includes only those appliances that do not exceed 210 degrees F (99 degrees C), maximum allowable working pressure (MAWP) of 160 psi (1103 kPa), volume of 120 gallons (454 L), or a heat input of 200,000 Btu/hr (58.6 kW). Appliances and equipment that exceed any one of these values are classified as boilers. The heat source for the equipment may be fired, electric, thermal, solar, or indirect.

WATER HEATER, POOL means a potable hot water heater that is listed for use of heating water for pools, spas, saunas, and similar equipment and only includes those appliances that do not exceed 210 degrees F (99 degrees C), maximum allowable working pressure (MAWP) of 160 psi (1103 kPa), volume of 120 gallons (454 L), or a heat input of 200,000 Btu/hr (58.6 kW). Appliances and equipment that exceed any one of these values are classified as boilers.

WATER HEATER, POTABLE (FIRED, ELECTRIC, THERMAL, SOLAR, AND INDIRECT) means any heating appliance or equipment that is listed for the use of heating potable water and supplies such water to the potable hot water distribution system, and includes only those appliances that do not exceed 210 degrees F (99 degrees C), maximum allowable working pressure (MAWP) of 160 psi (1103 kPa), volume of 120 gallons (454 L), or a heat input of 200,000 Btu/hr (58.6 kW). Appliances and equipment that exceed any one of these values are classified as boilers.

Section 3 - Applicable Installation Codes, Listings, and Standards

3.1 Required codes. Boilers and pressure vessels installed within The City of Seattle shall conform to this code and the minimum manufacturing standards, including any addenda, in effect on the date of manufacture as listed in Section 3.1.1 below. Where differences occur between the requirements of this code and the codes and standards referenced in Sections 3.1.1.A through 3.1.1.E, the provisions of this code apply.

3.1.1 Applicable codes and standards.

A. The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Sections I, III, IV, VIII, X, and PVHO-1.

B. The American National Standards Institute ANSI B31.1.0 Power Piping Code.

C. Boilers with burner fuel input ratings of 12,500,000 Btu/hour or more shall comply with the fuel train requirements set forth in NFPA 85.

D. Appurtenances that are not within the scope of the ASME construction codes may be constructed to a nationally recognized standard of construction approved by the code official.

E. Jacketed steam kettle vessels that are equal to or greater than 1 ½ cubic feet in volume (11.22 gallons capacity) shall be ASME code stamped.

3.2 Listing. Appurtenances, such as safety controls, operating controls, burner assemblies, and fuel trains, shall bear the mark of a recognized listing agency or the appropriate certifications as listed by the manufacturer. Appurtenances shall be installed and operated in accordance with the requirements of the listing or the manufacturer's certification and written instructions. Electrical components and wiring shall bear the mark of a recognized listing agency and have a listing appropriate for the environment of the installation.

3.3 Symbol of construction and registration. Boilers and pressure vessels shall bear the appropriate symbol of construction required by the ASME Boiler and Pressure Vessel Code, and shall be registered with the National Board of Boiler and Pressure Vessel Inspectors.

Exception: Cast iron boilers and pressure vessels bearing the ASME UM stamp.

Section 4 - Permits

4.1 Permits required. Except as otherwise specifically provided in this code, the installer shall obtain a boiler/pressure vessel permit from the code official prior to commencement of the following work:

1. Installation or replacement of new or used boilers and pressure vessels.
2. Installation of rental boilers.
3. Certification of boilers as Automatic.
4. Certification of boilers as Monitored.
5. Modification of existing control systems on boilers certified as Automatic or Monitored.
6. Replacement or modification of fuel burners, changing fuels, or adding different fuel combinations.
7. Repair or Alteration of boilers or pressure vessels.
8. Installation of pressure vessels containing lethal substances.
9. Potable water heaters that exceed any of the following limits, which are classified as boilers:
    a. 200,000 BTU/Hr input
    b. 120 Gallons capacity
    c. 160 PSIG
    d. 210 Degrees F.

Informational Note: Seattle Energy Code Section C403.1.4 restricts the use of electric resistance and fossil fuel-fired equipment for HVAC heating in most buildings, and Section C404.2.3 restricts the use of electric resistance and fossil fuel-fired service water heating equipment in Group R-1 and R-2 buildings.

4.2 Exemption from permits. The following boilers, pressure vessels, and other equipment do not require a boiler/pressure vessel permit from the code official:

1. Portable unfired pressure vessels that are inspected by the State of Washington as required by chapter 70.79 RCW;
2. Containers for liquefied petroleum gases regulated by the Seattle Fire Code;
3. Any boiler or pressure vessel subject to regular inspection by federal inspectors or licensed by a federal authority, such as the Department of Transportation (DOT);
4. Pressure vessels located in Groups B, F, H, M, R, S, and U Occupancies having a volume of 5 cubic feet or less and operated at pressures not exceeding 250 psi.
Note: Expansion tanks exempted for size shall conform to the requirements of ASME Section IV, HG-709 or HLW-809 applicable edition together with applicable addenda.
5. Water storage tanks with no air cushion and no energy or heat source;
6. Boilers and pressure vessels under the direct ownership and operation of the State of Washington that are inspected in accordance with Washington State boiler and pressure vessel rules (chapter 70.79 RCW) and have a current Washington State certificate to operate; and
7. Potable water heaters that do not exceed any of the following limits:
    a. 200,000 BTU/Hr input
    b. 120 Gallons capacity
    c. 160 PSIG
    d. 210 Degrees F.

Note: Potable water heaters require a plumbing permit issued from Public Health – Seattle and King County.

4.3 Application for permit. To obtain a permit, the installer shall first file an application in a format determined by the code official. Every application shall:

1. Identify and describe the work to be covered by the permit for which application is made.
2. Describe the land on which the proposed work is to be done by legal description, property address, or similar description that will readily identify and definitively locate the proposed building or work.
3. Be accompanied by construction documents and/or specifications in the standard ASME form (Manufacturers' Data Report) when required by the code official.
4. Be signed by the owner of the property or building, or the owner's authorized agent, who may be required to submit evidence to indicate such authority.
5. Include the names, addresses, and phone numbers of the boiler owner, general contractor, and any other contractor or contact persons.
6. Provide additional data and information, including but not limited to the manufacturer name and serial number, as may be required by the code official.

4.4 Construction documents. The code official may require that one or more sets of construction documents including plans, computations, and specifications be prepared and submitted to the City. Construction documents shall be submitted to the code official or designee at the time of the first boiler inspection. Nothing shall prevent the code official from requiring the submittal of construction documents prior to the issuance of the permit. Plans and specifications shall be drawn to a clearly indicated and commonly accepted scale in a format determined by the code official. The construction documents shall be sufficiently clear for electronic storage and shall show that the proposed installation conforms to the provisions of this code and to the provisions of all applicable laws, ordinances, rules, regulations, and orders.

4.5 Emergency repairs. In the case of an emergency, the installation of any boiler or pressure vessel or auxiliary equipment may be made without first applying for a permit. The code official shall be given notice by email or voicemail of the work performed within 24 hours or one business day from the time when the emergency work was started. Permit applications shall be submitted within the later of 24 hours or one working day from the start of the emergency work or as directed by the code official.

4.6 Application review and permit issuance. The application shall be reviewed by the code official or designee. The application may be reviewed by other departments of the City to check compliance with the laws and ordinances under their jurisdiction.

4.6.1 Issuance of permit. The code official shall issue a permit to the applicant if the code official finds the following:

1. The work described in the application, and other construction documents when required by the code official prior to issuance, substantially conforms to the requirements of this code and other pertinent laws and ordinances;
2. The permit fees specified in Seattle Municipal Code, Title 22, Subtitle IX, Permit Fees, commonly known as the Fee Subtitle, have been paid; and
3. The applicant has complied with all requirements to be performed prior to issuance of a permit for the work under other pertinent laws, ordinances, or regulations or included in a master use permit, or otherwise imposed by the code official. When the permit is issued, the applicant or the applicant's authorized agent becomes the permit holder.

4.6.2 Compliance with approved construction documents. When the code official issues a permit, the code official shall endorse the permit in writing or in electronic format and, where plans have been required, stamp the plans "APPROVED." Such approved plans and permit shall not be changed, modified, or altered without authorization from the code official, and all work shall be done in accordance with the approved construction documents and permit except as authorized by the code official during a field inspection to correct errors or omissions, or as authorized by Section 4.6.3.

4.6.3 Revisions to the permit. When changes to the approved work are made during construction, approval of the code official shall be obtained prior to execution. The boiler and pressure vessel inspector may approve minor changes for work not reducing the structural strength or fire and life safety of the structure or the integrity of the boiler or pressure vessel or auxiliary equipment. The inspector shall determine if it is necessary to revise the approved construction documents. If revised plans are required, changes shall be submitted to and approved by the code official, accompanied by fees specified in the Fee Subtitle, Seattle Municipal Code, Title 22, Subtitle IX, Permit Fees, prior to occupancy. All changes shall conform to the requirements of this code and other pertinent laws and ordinances and other issued permits. Minor changes shall not incur additional fees if these changes do not (1) add to the general scope of work; (2) change the basic design concept; (3) involve major relocation of equipment, ducts, or pipes; (4) substantially alter approved equipment size; or (5) require extensive re-review of the plans and specifications.

4.6.4 Cancellation of permit applications. Applications may be cancelled if no permit is issued by the earlier of the following: (1) 12 months following the date of application; or (2) 60 days after the date of written notice that the permit is ready to be issued. After cancellation, construction documents may be returned to the applicant or destroyed by the code official. The code official shall notify the applicant in writing at least 30 days before the application is cancelled. The notice shall specify a date by which a request for extension must be submitted to avoid cancellation. The date shall be at least two weeks prior to the date on which the application will be cancelled.

4.7 Validity of permit. The issuance or granting of a permit or approval of construction documents shall:

1. Not be construed to be a permit for, or an approval of, any violation of any provisions of this code or any other pertinent laws and ordinances.

2. Not prevent the code official from requiring correction of conditions found to be in violation of this code or other pertinent laws and ordinances of the City.
3. Not prevent the code official from requiring the correction of errors in the construction documents or from preventing building operations being carried on thereunder when in violation of this code or of other pertinent laws and ordinances of the City.
4. Not be construed to extend the period of time for which any such permit is issued or otherwise affect any period of time for compliance specified in any notice or order issued by the code official or other administrative authority requiring the correction of any such conditions.

4.8 Permit Expiration. Authority to do the work authorized by a permit expires 18 months from the date of issuance. An approved renewal extends the life of a permit for an additional 18 months from the prior expiration date. An approved reestablishment extends the duration of the permit for 18 months from the date the permit expired.

Exceptions:

1. Initial permits for major construction projects that require more than 18 months to complete may be issued for a period that provides reasonable time to complete the work, according to an approved construction schedule. The code official may authorize a permit expiration date not to
exceed three years from the date of issuance.
2. The code official may issue permits that expire in less than 18 months if the code official determines a shorter period is appropriate to complete the work.

4.9 Renewal of permits. Permits may be renewed, and renewed permits may be further renewed by the code official, if the following conditions are met:

1. Application for renewal is made within the 30-day period immediately preceding the expiration date of the permit; and
2. The project has had an associated discretionary land use review and the land use approval has not expired; and
3. If the application for renewal is made more than 18 months after the date of mandatory compliance with a new or revised edition of this code, the permit shall not be renewed unless:
    a. The code official determines that the permit complies, or is modified to comply with the Seattle Boiler and Pressure Vessel Code in effect on the date of application for renewal; or
    b. The work authorized by the permit is substantially underway and progressing at a rate approved by the building official. “Substantially underway” means that normally required inspections have been approved for work such as foundations, framing, mechanical, and insulation and finish work is being completed on a continuing basis; or
    c. Commencement or completion of the work authorized by the permit is delayed by litigation, appeals, strikes, or other causes related to the work authorized by the permit that are beyond the permit holder’s control.

4.10 Reestablishment of expired permits. A new permit is required to complete work if a permit has expired and was not renewed.

Exception: A permit that expired less than one year prior to the date of a request for reestablishment may be reestablished without the issuance of a new permit upon approval of the code official if it complies with Items 2 and 3 of Section 4.9. Once re-established, the permit will not be considered to have expired. The new expiration date of a re-established permit shall be determined in accordance with Section 4.8.

4.11 Revocation of boiler and pressure vessel permits. Whenever the code official determines there are grounds for revoking a permit, the code official may issue a notice of revocation. The notice of revocation shall identify the reason for the proposed revocation, including, but not limited to, the violations, the conditions violated, and any alleged false or misleading information provided.

4.11.1 Standards for revocation. The code official may revoke a permit if:

1. The code or the permit has been or is being violated and issuance of a notice of violation or stop work order has been or would be ineffective to secure compliance because of circumstances related to the violation; or
2. The permit was obtained with false or misleading information.

4.11.2 Service of notice of revocation. The notice of revocation shall be served upon the owner, agent, or other responsible person by personal service or regular first class mail addressed to the last known address of such person, or if no address is available after reasonable inquiry, the notice may be posted in a conspicuous place on the premises. The notice may also be posted if served by personal service or first-class mail.

4.11.3 Effective date of revocation. The code official shall identify in the notice of revocation a date certain on which the revocation will take effect. This date may be stayed pending complete review by the code official pursuant to Section 4.11.4.

4.11.4 Review by the code official for notice of revocation. Any person aggrieved by a notice of revocation may obtain a review by making a request in writing to the code official within three business days of the date of service of the notice of revocation. The review shall occur within five business days after receipt by the building official of the request for review. Any person affected by the notice of revocation may submit additional information to the building official for consideration as part of the review at any time prior to the review.

A. Review procedure. The review will be made by a representative of the code official who will review all additional information received and may also request a site visit. After the review, the code official may:

1. Sustain the notice of revocation and affirm or modify the date the revocation will take effect;
2. Withdraw the notice of revocation;
3. Modify the notice of revocation and affirm or modify the date the revocation will take effect; or
4. Continue the review to a date certain.

B. Order of revocation of permit. The code official shall issue an order containing the decision within ten days after the review is completed and shall cause the same to be sent by regular first-class mail to the person or persons requesting the review, any other person on whom the notice of revocation was served, and any other person who requested a copy before issuance of the order. The order of the building official is the final order of the City, and the City and all parties shall be bound by the order.

4.12 Fees. A fee for each boiler and pressure vessel permit and for other activities related to the enforcement of this code shall be paid as set forth in the Fee Subtitle, Seattle Municipal Code, Title 22, Subtitle IX, Permit Fees. The permit fee covers the cost of the inspection to verify that the installation has been completed in accordance with the permit.

4.13 Inspections: General.

4.13.1 Inspection of work. Boilers and pressure vessels for which a permit is required by this code shall be subject to inspection by the code official.

4.13.2 Approval in error. Approval resulting from an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the City. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the City shall not be valid.

4.13.3 Inspector qualifications. City-employed inspectors holding a current inspector's commission with the National Board of Boiler and Pressure Vessel Inspectors shall conduct the required inspections and use the current edition of the National Board Inspection Code (NBIC), Part 1, as a guide for conducting the inspection. When differences occur between the requirements of this code and other codes and standards, this code shall apply.

> **Informational Note:** The acronym (NBIC) stands for **National Board Inspection Code**. The NBIC provides standards for the installation, inspection, and repair and/or alteration of boilers, pressure vessels, and pressure relief devices.

4.13.4 Responsibility for inspection requests. It is the duty of the installer to notify the code official that work requiring inspection as specified in this section is ready for inspection.

4.13.5 Access for inspection. The permit holder and the person requesting any inspections required by this code shall provide access to and means for proper inspection of such work. The work shall remain accessible and exposed for inspection purposes. Neither the code official nor the City shall be liable for expenses incurred in the removal or replacement of any material impeding the access necessary to perform required inspections.

4.13.6 Posting permit. The permit holder or permit holder's agent shall post the permit in a conspicuous place on the premises as directed by the code official.

4.13.7 Approvals required. No work shall be done on any part of the building or structure beyond the point indicated in each successive inspection without first obtaining the written approval of the code official.

A. Effect of approval. Approval resulting from an inspection is not approval of any violation of the provisions of this code or of other pertinent laws and ordinances of the City. Inspections presuming to give authority to violate or cancel the provisions of this code or of other pertinent laws and ordinances of the City are not valid.

4.13.8 Testing of equipment and systems. The code official may require testing of equipment and systems as part of permit inspections.

4.13.9 Inspections required. The installation of boilers and pressure vessels must be inspected. The following inspections may be required by the code official:
A. Special investigation inspection. If work that requires a permit or approval is commenced or performed prior to making formal application and receiving the code official's permission to proceed, the code official may make a special investigation inspection before a permit is issued for the work. If a special investigation is made, a special investigation fee may be assessed in accordance with the Fee Subtitle, Seattle Municipal Code, Title 22, Subtitle IX, Permit Fees.
B. Pre-installation inspection. When the owner or the owner's authorized representative requests inspection of a boiler prior to its installation, the code official shall make the inspection. Any additional inspection outside the scope of the permit may be subject to additional fees in accordance with Fee Subtitle, Seattle Municipal Code, Title 22, Subtitle IX, Permit Fees.
C. Final Inspection. When the installation of a boiler or pressure vessel, its auxiliary equipment or related system, is complete, a final inspection shall be performed approving the boiler, pressure vessel, auxiliary equipment or related system as ready for service.
D. Reinspection. The code official may require a reinspection if:

1. Work for which inspection is requested is not complete;
2. Required corrections called for are not made;
3. The permit record is not properly posted on the work site;
4. The approved plans are not readily available to the inspector;
5. Deviations from construction documents that require the approval of the code official have been made without proper approval;
6. Access is not provided on the date requested for the inspection; or
7. Other unforeseen hazards identified by the code official.

4.13.10 Reinspection fees. The code official may assess a reinspection fee as set forth in the Fee Subtitle, Seattle Municipal Code, Title 22, Subtitle IX, Permit Fees, for reinspection. In instances where reinspection fees have been assessed, no additional inspection of the work will be performed until the required fees are paid.

4.14 Requirements for new installations.
A. On-site. The code official shall require:

1. Boiler installations to have equipment controls set, adjusted, and tested by the installing contractor upon completion.
2. The following documentation to be on site and available to the inspector upon request:
   (a) the Department issued permit, (b) National Board or ASME Data Report(s), and (c) manufacturer's installation and operation instructions.
3. Tests deemed necessary to determine that the installation complies with the provisions of this code. Such tests shall be made in the presence of the code official.
4. Access to, and the means for, safe inspection of the installation.

4.15 Testing rental and used boilers. Rental boilers and used boilers are subject to hydrostatic testing, non-destructive testing, or other special testing as may be required by the code official.

4.16 Combustion air. Combustion air shall be provided in accordance with Chapter 7 of the Seattle Mechanical Code.

4.17 Venting. Venting of combustion byproducts shall be in accordance with Chapter 8 of the Seattle Mechanical Code. Gas-fired appliances shall be vented in accordance with Chapter 5 of the Seattle Fuel Gas Code. Stack dampers on boilers fired with oil or solid fuel shall not close off more than 80 percent of the stack area when closed. Operative dampers shall not be placed within any stack, flue, or vent of a gas-fired boiler.
Exception: Automatic boilers with pre-purge, automatic draft control, and interlock.

4.18 Controls, safety devices, and instrumentation. Required electrical, mechanical, safety, and operating controls shall carry approval of an approved testing agency. Electrical controls shall be of such design and construction as to be suitable for installation in the environment in which they are located.
4.18.1 Valves. No valve shall be placed between a safety device and the boiler or pressure vessel.
4.18.2 Burners.
A. All burners shall be listed by a nationally recognized testing agency. Burners that are integral parts of boilers shall be listed as part of the overall boiler/burner assembly.
B. Burners capable of burning two or more fuels and installed on or after June 1, 1987, shall be equipped with a fuel selector switch designed and constructed to prevent switching from one fuel to a different fuel without a physical stop in the center/off position.

4.18.3 Gauges. The following gauges are required and shall be kept in good working condition.
A. All steam boilers shall be provided with a pressure gauge and a water level glass.
B. All water boilers shall be provided with a pressure gauge and a temperature indicator.

4.18.4 Pressure and temperature relief.
A. Overpressure protection. All boilers and pressure vessels shall be protected from excess pressure as specified in the applicable ASME Code Section or recognized standard. Pressure relief devices shall be installed per the applicable ASME Code Section or the manufacturer's requirements, subject to the following additional requirements:

1. Safety relief valves. Safety relief valves on boilers and pressure vessels shall be sized in accordance with the manufacturer's instructions or as approved by the code official.
2. Discharged liquid. The discharge from liquid relief valves shall be piped to within 18 inches of the floor to an open receptacle or floor drain. If the discharged liquid has the potential to exceed 140ºF then the discharge shall be cooled prior to entering a drainage system in accordance with the requirements found in the Chapter 8 of the Seattle Plumbing Code.
3. Safety valve discharge. Safety valve discharge from boilers and pressure vessels containing steam shall be directed upward to a minimum of 6 feet above the boiler room floor or horizontally to an inaccessible area of the boiler room. If the discharge from safety valves would

result in a hazardous discharge of steam inside the boiler room, or if the discharge of safety valves on boilers exceeds the capacity of 1,000 pounds of steam per hour, the steam discharge shall be extended outside the boiler room to a safe location. No valve shall be placed on the discharge pipe between the safety relief valve and the atmosphere.

4.18.5 Emergency shutdown switch. Automatically fired boilers exceeding 400,000 BTU/Hr input, or 400,000 BTU/Hr combined capacity in multiple boiler installations, including electric boilers exceeding 117KW, shall have an emergency shut down switch installed outside the boiler room, or in another location approved by the code official. If there is more than one door to the boiler room, there shall be a switch located at each door. The switch shall allow shutdown of all boilers in the boiler room without having to enter the boiler room. The emergency shutdown switch shall be suitable for the intended use and marked for easy identification.

4.18.6 Low-water cutoff or flow-sensing devices.

A. For water boilers. Water boilers shall be equipped with a manual reset type low-water cutoff device.

1. Low-water cutoff devices shall be mounted so that activation of the device does not damage the boiler or reset the device.
2. Low-water cutoff devices shall be capable of being tested without draining the boiler system.
3. Manually operated and power-actuated isolation valves between the low-water cutoff and the boiler are prohibited.
4. Delay functions incorporated in any low-water cut-off device requires pre-approval by the code official. Delay functions shall be installed in accordance with the manufacturer's instructions.
5. In installations where two or more low-water cutoffs are installed, the cutoffs shall be separately piped where feasible.

B. For forced circulation boilers. Boilers that require forced circulation to prevent overheating shall have a flow-sensing device installed.

1. Flow-sensing devices shall be mounted so that activation of the device does not damage the boiler or reset the device.
2. Flow sensing devices shall be testable without draining the boiler system.
3. Delay functions incorporated in any flow-sensing device require pre-approval by the code official. Approved delay functions shall be installed in accordance with the manufacturer's instructions.

C. For steam boilers. Every steam boiler shall be equipped with two low-water cutoffs. The lower of the two cutoffs shall be equipped with a manual reset device. This device shall be so located as to automatically cut off the fuel supply before the surface of the water falls below the lowest visible part of the water gauge glass.

1. The manual reset device shall be mounted so that activation of the device does not damage the boiler or reset the device.
2. The manual reset device shall be testable without draining the boiler system.

3. Manually operated and power-actuated isolation valves between the low-water cutoff and the boiler are prohibited.
4. Delay functions incorporated in any low-water cut-off device requires pre-approval by the code official. Approved delay functions shall be installed in accordance with the manufacturer's instructions.
5. In installations where two or more low-water cutoffs are installed, the cutoffs shall be separately piped where feasible.

Exceptions to Items A through C:
1. Manually fired water and steam boilers.
2. Hot water supply boilers, such as those bearing the ASME "HLW" stamp, that are directly connected to and pressurized by the public water supply.

4.18.7 Additional required devices.
A. Temperature control. Water and liquid boilers shall be equipped with two temperature controls, one of which shall have a manual reset device.
B. Pressure control. Steam and vapor boilers shall be equipped with two pressure controls, one of which shall have a manual reset device.
C. Automatic water feeding devices. All steam, vapor, and water boilers shall be equipped with an automatic water feeding device. For steam boilers and boilers having an operating water level, the water feeder shall be controlled by the actual water level in the boiler.
Exception: Manually operated boilers that have a qualified person in constant attendance of the boiler while it is in operation to ensure adequate water feed.
D. Blow-off tank. All steam boilers shall be equipped with a blow-off tank fabricated in accordance with the National Board of Boiler and Pressure Vessel Inspectors Blow-off Equipment Standard NB-27. Blow-off tanks shall collect and temper water and steam discharged from safety relief valves and, as applicable, from blow-off and blowdown effluent and low-water fuel cut-off drains. Effluent shall not exceed 140 degrees F prior to entering building drains. (See Seattle Plumbing Code).
Exception: An alternative means for safe discharge may be approved by the code official.
E. Expansion tanks. All closed hot water heating systems shall be provided with an expansion tank. Expansion tanks shall be fabricated to ASME Section IV Standard HG-709. Expansion tanks shall be sized appropriately and securely fastened to supports that are adequate to support twice the weight of the tank filled with water without placing strain on connecting piping.
F. Mechanically fired boilers which require manual ignition or lighting of the burner shall have a manual reset device to prevent automatic recycling in the event of any shut down.
G. Energy management systems. Energy management systems shall not have the ability to override safety devices required by this code. Such systems may only connect to a boiler control system at points provided by the manufacturer for such use.

4.19 Location of boilers and pressure vessels.
4.19.1 Clearance requirements. When boilers and pressure vessels are installed or replaced, clearance shall be provided to allow access for safe operation, inspection, maintenance, and repair. Passageways around all sides of boilers and pressure vessels shall have an unobstructed

width of not less than 18 inches. Clearance for repair and cleaning may be provided through a door or access panel into another area, provided the opening is of sufficient size.

Exception: When approved by the code official, boilers and pressure vessels may be installed with a side clearance of less than 18 inches provided that the lesser clearance does not inhibit inspection, maintenance, and repair or violate the terms of the listing or the manufacturer's installation instructions.

A. Power boilers having a steam generating capacity in excess of 5,000 pounds per hour or having a heating surface in excess of 1,000 square feet or inputs in excess of 5,000,000 Btu/h shall have a minimum clearance of 7 feet from the top of the boiler to the ceiling.

B. Steam heating boilers and hot water heating boilers which exceed one of the following limits: 5,000,000 Btu/h input, 5,000 pounds steam-per-hour capacity, or 1,000 square-foot heating surface; power boilers which do not exceed one of the following limits: 5,000,000 Btu/h input, 5,000 pounds steam-per-hour capacity, or 1,000-square-foot heating surface; and all boilers with manholes on top of the boiler, except those described in Items A and C, shall have a minimum clearance of 3 feet from the top of the boiler to the ceiling.

C. Package boilers, steam heating boilers, and hot-water heating boilers with no manhole on top of shell and not exceeding one of the limits contained in subsection 4.19.1.B shall have a minimum clearance of 2 feet from the ceiling.

D. Manhole openings shall have a minimum of 5 feet clearance from any outside obstruction.

4.19.2 Underground installations. Boilers and pressure vessels installed underground shall be enclosed in a concrete or masonry pit. A covered pit shall be equipped with a removable cover so that adequate inspection can be made. Requirements for clearances shall be the same as Section 4.19.1.

4.19.3 Boiler rooms.

A. Construction. Boiler rooms shall be constructed in accordance with the current edition of the Seattle Building or Residential Code. Equipment shall be mounted to adequately support the vessel and its contents and keep the equipment level and safely anchored to prevent unwanted movement and damage due to vibration. Floors shall be of noncombustible materials or listed as appropriate for the equipment being mounted. Floors shall have an adequate drain system or legal method of catching and holding liquid wastes incidental to cleaning, recharging, or discharging of safety relief valves.

B. Access platform. Platforms to conduct maintenance and inspection shall be provided to allow safe access and egress to each boiler or pressure vessel.

4.19.4 Garage or warehouse locations. Boilers and pressure vessels installed in garages, warehouses, or other locations where damage from moving vehicles is possible shall be protected with barriers or shall be elevated or located outside the path of vehicles. Boilers, if fuel-fired and installed in garages, shall be at least 18 inches above the floor level. (See Seattle Mechanical Code Section 304.)

Exception: Boilers and pressure vessels installed within a garage may be enclosed in a separate approved compartment having access only from outside the garage if the required combustion air is taken from and discharged to the exterior of the garage.

4.20 Pressure reducing valves.

4.20.1. Limiting equipment pressure. All the equipment downstream of the boiler or pressure vessel shall:

A. Meet the pressure requirements for the maximum allowable working pressure (MAWP) of the boiler or pressure vessel; or

B. Have a pressure reducing system that includes:

1. Safety relief valves. The low-pressure side of the pressure reducing valve shall be protected by one or more safety valves having adequate volume capacity and a set pressure not to exceed the MAWP of equipment or piping installed downstream of the pressure reducing valve.
2. Pressure gauges. Pressure gauges shall be installed on the high and low pressure sides of the pressure reducing valve.
3. Venting. Proper protection shall be provided to prevent injury or damage caused by the discharge of the safety relief valves when vented to the atmosphere.
4. Bypass valves. The use of a hand-controlled bypass around the reducing valves is allowed. The capacity of the bypass valve shall not exceed the capacity of the reducing valve.

4.21 Fuel piping

4.21.1. Manual shutoff valves. An approved manual shutoff valve shall be installed upstream of all control devices on the main burner of a gas-fired boiler. The takeoff point for the gas supply to the pilot shall be valved separately and be upstream of the gas shutoff valve for the main burner. A union or other approved means of disconnect shall be provided immediately downstream from these shutoff valves.

4.21.2. Gas pressure regulators. An approved gas-pressure regulator shall be installed on gas-fired boilers if the gas supply pressure is higher than that at which the main burner is designed to operate. A separate approved gas-pressure regulator shall be installed to regulate the gas pressure to any pilot.

Exceptions: A separate regulator is not required if the pilot:

1. Is part of a manufacturer-assembled boiler-burner unit approved by the code official;
2. Serves a gas-fired boiler in Group R Occupancies of less than six units; or
3. Serves a gas-fired boiler in Group U Occupancies.

4.21.3 Code compliant. Fuel piping installation shall comply with the provisions of the current edition of the Seattle Fuel Gas Code.

4.22 Steam and hydronic piping. Steam and hydronic piping systems that are part of a boiler or heating system shall comply with the requirements of the Seattle Mechanical Code, Chapter 12, Hydronic Piping, and the requirements of this code. When piping falls outside the scope of the applicable sections of the above codes, a standard approved by the code official may be used.

4.22.1 Materials and construction.

A. Quality. All piping, tubing, valves, joints, fittings, devices, and materials shall be free of defects and shall comply with nationally recognized standards of construction listed in Section 3 of this code or as approved by the code official.
B. Prohibited. Galvanized piping and fittings are prohibited.

4.23 Elevator machine rooms/spaces and hoistways. No pipes conveying gases, vapors, or liquids that are not specifically used in the operation of the elevator shall be installed in any elevator hoistway, machine room, or machinery space.

4.24 Alarms. Alarms such as CO detectors, smoke detectors, CO_2 detectors, or other alarms required by this code or other codes are subject to inspection by the code official. Alarms shall be properly maintained and upon request by the code official shall be demonstrated to be in good working order.

4.25 Boilers certified as automatic. The Seattle Steam Engineer and Boiler Fireman License Law, Seattle Municipal Code Chapter 6.420, provides for reduced attendance requirements for boilers that are certified as automatic. Boilers certified as automatic are required to have the following:

1. Control and limit devices as set forth in Table 4.25 or as certified by the manufacturer if approved by the code official to be equivalent.
2. Feed water systems not requiring manual operation.
3. Stack temperature gauges.
4. Oil temperature and oil suction pressure gauges and/or high and low gas pressure gauges, as applicable.
5. The original equipment manufacturer's operating and installation manual, together with electrical schematics or diagrams.
6. Boilers 12.5 MM BTU/H and greater. All boilers certified as automatic of 12,500,000 Btu/h input and greater shall also comply with the installation requirements of the current edition of NFPA 85, Boiler and Combustion Systems Hazards Code.
7. Solid fuel boilers. The code official may approve solid-fuel-fired boilers that meet the safety requirements for automatic gas- or oil-fired boilers.

Table 4.25-A (Part 1 of 2)

Boiler Group	Fuel	Fuel Input[1] Range in BTU/hr. (inclusive)	Type of Pilot[2]	Safety Control Timing (in seconds unless otherwise indicated)				Assured Fuel Supply Control[4]	Assured Fuel Supply Control[5]
				Trial for Pilot	Trial for Main Burner Flame		Main Burner Flame Failure[3]		
					Direct Electric Ignition	Flame Pilot			
A	Gas	0 – 400,000	Any type	90	Not required	90	90	Not required	Required
B	Gas	400,001 – 2,500,000	Any type	15	15	15	2 – 4	Not required	Required
C	Gas	2,500,001 – 12,500,000	Interrupted or intermittent	15	15	15	2 – 4	Required	Required
D	Gas	Over 12,500,000	Interrupted	15	15	15	2 – 4	Required	Required
E	Oil	0 – 400,000	Any type	Not required	90	90	90	Not required	Required
F	Oil	400,001 – 3,000,000	Interrupted	Not required	30	30	2 – 4	Required	Required
G	Oil	3,000,001 – 12,500,000	Interrupted	Not required	15	15	2 – 4	Required	Required
H	Oil	Over 12,500,000	Interrupted	15	15	60	2 – 4	Required	Required
K	Electric	All	Not required	Not required	Not required	Not required	Not required	Not required	Not required

Table 4.25-A (Part 2 of 2)

Boiler Group	Fuel	Fuel Input Range in BTU/hr. (inclusive)[1]	Low Fire Start Up Control[6]	Pre-purging Control[7]	Hot Water Temperature and Low Water Limit Controls[8]	Steam Pressure and Low Water Limit Controls[9]	Approved Fuel Shutoff[10]	Control and Limit Device System Design[11]
A	Gas	0 – 400,000	Not Required	Not Required	Required	Required	Not Required	Required
B	Gas	400,001 – 2,500,000	Not Required	Not Required	Required	Required	Not Required	Required
C	Gas	2,500,001 – 12,500,000	Required	Required	Required	Required	Required	Required
D	Gas	Over 12,500,000	Required	Required	Required	Required	Required	Required
E	Oil	0 – 400,000	Not Required	Not Required	Required	Required	Not Required	Required
F	Oil	400,001 – 3,000,000	Not Required	Not Required	Required	Required	Not Required	Required
G	Oil	3,000,001 – 12,500,000	Required	Required	Required	Required	Required	Required
H	Oil	Over 12,500,000	Required	Required	Required	Required	Required	Required
K	Electric	All	Not Required	Not Required	Required	Required	Not Required	Required

Footnotes for Table 4.25, Parts 1 and 2.

1. Fuel input shall be determined by one of the following:
   (a) The maximum burner input as shown on the burner nameplate or as otherwise identified by the manufacturer.
   (b) The nominal boiler rating, as determined by the code official, plus 25 percent.
   (c) A permanently affixed meter to indicate fuel consumption, timed to determine the rate of fuel input.
2. Automatic boilers shall have one flame failure device on each burner which shall prove the presence of a suitable ignition source at the point where it will reliably ignite the main burner, except that boiler groups A, B, E, F, and G which are equipped with direct electric ignition shall monitor the main burner, and all boiler groups using interrupted pilots shall monitor only the main burner after the prescribed limited trial and ignition periods. Continuous pilots used in boiler groups A and B shall accomplish 100 percent shutoff upon pilot flame failure. Intermittent pilots may be used in group C for atmospheric burners only, provided the input per combustion chamber does not exceed 5,000,000 Btu/h and modulating or high-low firing is not employed.
3. Continuous pilots provided on manufacturer assembled boiler-burner units must be tested by an approved agency complying with nationally recognized standards and approved by the code official.

4. Boiler groups C and D shall have controls interlocked to accomplish a non-recycling fuel shutoff upon detecting high or low gas pressure. Boiler groups F, G, and H using steam or air for fuel atomization shall have controls interlocked to accomplish a non-recycling fuel shutoff upon detecting low atomizing steam or air pressure. Boiler groups F, G, and H equipped with a preheated oil system shall have controls interlocked to provide fuel shutoff upon detecting low oil temperature.
5. Automatic boilers shall have controls interlocked to shut off the fuel supply in the event of draft failure if forced or induced draft fans are used or, in the event of low combustion air flow, if a gas power burner is used. In boiler groups C, D, G, and H failure to prove the air flow required shall result in a safety shutdown. Where a single motor directly driving both the fan and the oil pump is used, a separate control is not required.

6. Boiler groups C, D, G, and H, when firing in excess of 400,000 Btu per combustion chamber, shall be provided with low fire start of its main burner system to permit smooth light-off. This will normally be a rate of approximately one-third of its maximum firing rate.
7. Boiler groups B, C, D, G, and H shall not permit pilot or main burner trial for ignition operation before a purging operation of sufficient duration to allow a minimum of four complete air changes through the furnace, including combustion chamber and the boiler passes. Where this is not readily determinable, five complete air changes of the furnace, including combustion chamber up to the first pass, are considered equivalent. An atmospheric gas burner with no mechanical means of creating air movement or an oil burner which obtains two-thirds or more of the air required for combustion without mechanical means of creating air movement shall not require purge by means of four air changes so long as its secondary air openings are not provided with means of closing. If such burners have means of closing secondary air openings, a time delay shall be provided which puts these closures in a normally open position for four minutes before attempting ignition. An installation with a trapped combustion chamber shall always be provided with a mechanical means of creating air movement for purging. Purge air flow in boiler groups C, D, G, and H shall be proved. Proof of purge air flow may be accomplished by providing:
(1) Air pressure and “open damper” interlocks for all dampers in the flow path, or
(2) Air flow interlock.
8. Shall comply with Section 4.18 of this code.
9. Shall comply with Section 4.18 of this code.
10. Automatic boilers firing gas or using gas pilots shall be equipped with an approved safety shutoff valve(s) in the main gas burner supply line or pilot gas burner supply line. The safety shutoff valve(s) shall be interlocked to the required programming control devices. Boilers in group C having an input per combustion chamber which does not exceed 5,000,000 Btu/h shall have two safety shutoff valves in series or one safety shutoff valve of the type incorporating a valve seal over travel interlock. Boilers in group C having an input per combustion chamber exceeding 5,000,000 Btu/h and boilers in group D shall have two safety shutoff valves in series and the downstream valve shall be of the type incorporating a valve seal over travel interlock. Boilers in groups C and D using gas in excess of one-half pound per square inch (½ lb/in2) pressure shall be provided with a permanent and ready means for making periodic tightness checks of the main fuel safety shutoff valves. Boilers in group D shall have a normally open electrically operated valve in a vent line between the two safety shutoff valves. This vent shall be sized in accordance with an approved vent sizing table but shall not be less than three-quarters (¾) inch pipe size. On oil burners where the safety shutoff valve will be subjected to pressures in excess of 10 psi, a second safety shutoff valve shall be provided in series with the first. In boiler group H where a second safety shutoff valve is required, the upstream valve shall be of the 3-way bypass or recirculating type. 11. Control and limit device systems shall be grounded with operating voltage not to exceed 150 volts, except that upon approval by the code official, existing control equipment to be reused in an altered boiler control system may use 220-volt single phase with one side grounded, provided such voltage is used for all controls. Control and limit devices shall interrupt the ungrounded side of the circuit. A readily accessible means of manually disconnecting the control circuit shall be provided with controls arranged so that when they are de-energized the burner shall be inoperative.

4.26 Boilers certified as monitored. Boilers certified as monitored shall comply with the reduced attendance requirements allowed by the Seattle Steam Engineer and Boiler Fireman License Law, Seattle Municipal Code Chapter 6.420. The boiler owner or lessee is responsible for compliance with this Section 4.26.

4.26.1 Definitions related to monitored boiler systems. For the purposes of this section, certain terms, phrases, words, and their derivatives shall be defined as follows:

CENTRAL STATION AGENCY means a 'Class A' Central Station Agency as defined and approved by the Seattle Fire Department.
MONITORING SYSTEM means a protective alarm signaling system used for surveillance of controls and limit devices required on certain automatic boilers.
ON-SITE MONITORED SYSTEM means a monitoring system with constant supervision by competent and experienced personnel in a central supervising station located on the site where the boiler is installed. The system includes equipment and facilities required to allow the boiler and monitoring system operators to test and operate the system and, upon receipt of a signal, to take responsive action.
SIGNALING SYSTEMS means electrically operated circuits, instruments, and devices, together with the necessary electrical energy designed to transmit alarms and trouble signals to the monitoring system operators to effectively monitor boilers.

4.26.2 Approval of monitoring systems.
A. Status. Monitored boiler status is available only to boilers certified by the code official as automatic boilers.
B. Acceptance tests. Upon completion of system installation, a satisfactory test of the entire installation shall be made in the presence of the City inspector. It shall be the responsibility of the applicant to demonstrate the operation and reliability of the monitoring system during the test of the equipment. The City inspector may require additional tests if deemed necessary for the operation and proper maintenance of the monitoring system and the boiler plant served by such system.
C. Inspection. An inspection by a City inspector may be conducted annually for certification renewal.
D. Listing required. All monitoring system devices shall be listed and labeled by a nationally recognized testing agency.

4.26.3 Signals, personnel, and reporting.
A. Required signals. The following signals are required:
1. Low water level;
2. Flame failure; and
3. Steam pressure at the upper limit setting on steam boilers or water temperature at the upper limit setting on hot water boilers. Upon sensing any of the above conditions, signal shall be sent to the monitoring system. The monitoring system shall send a signal if existing limit controls and flame failure devices have caused the boiler to shut down.

B. Monitoring system personnel. The monitoring station shall have sufficient personnel on duty to assure immediate attention to all signals received.
C. Report availability. Reports of all signals received by the monitoring station shall be made available when requested by the code official and as required in this Section 4.26.3.
D. Disposition of signals. Upon receipt of a signal pertaining solely to matters of equipment maintenance of the signaling systems, the monitoring station operating company shall:

1. Notify the property owner when the function of signaling system is interrupted and is not corrected within 12 hours.
2. Notify the on-site designated point of contact as soon as possible.
3. Notify the code official upon receipt of a signal not caused by routine inspection and maintenance.

E. Procedures to be available. Procedures for responding to signals shall be readily available to the on-site designated point of contact and shall include procedures for notifying the boiler supervisor and the code official.
F. Maintenance and repair of monitoring equipment.

1. The monitoring station operating company shall have a person available within two-hours' travel who is competent to inspect, maintain, and repair the monitoring equipment.
2. Maintenance. All monitoring station systems shall be under the supervision of qualified persons. These persons shall cause proper tests and inspection to be made at prescribed intervals and shall have general charge of all alterations and additions to the monitoring system under their supervision or a satisfactory agreement on the maintenance, operation and efficiency of the system shall be provided.

Section 5 - In-service inspections for existing installations

5.1 Duty to inspect. The code official shall inspect or have inspected all boilers and pressure vessels and listed potable water heaters. After satisfactory completion of inspections and upon receipt of fees as set forth in the Fee Subtitle, Seattle Municipal Code, Title 22, Subtitle IX, Permit Fees, the code official shall issue a Certificate of Inspection. Inspectors conducting in-service inspections must have current commissions issued by the National Board of Boiler and Pressure Vessel Inspectors. Inspectors can be either City inspectors or insurance company inspectors.

5.2 In-service inspection. In-service inspections are conducted in accordance with the current edition of the National Board Inspection Code (NBIC), Part 2. If differences occur between provisions of this code and referenced codes or standards, the provisions of this code apply. The code official shall keep a complete record of the type, dimensions, maximum allowable working pressure, age, condition, location, and date of the last recorded internal and external inspections of all boilers and pressure vessels regulated by this code.
Exemptions from in-service inspection. The following boilers, pressure vessels, and other equipment shall not be required to comply with in-service inspection requirements:

1. Portable. Portable unfired pressure vessels subject to regular inspection by the State of Washington (chapter 70.79 RCW).
2. LPG containers. Containers for liquefied petroleum gases regulated by the Seattle Fire Code.

3. Specific unfired pressure vessels. Unfired pressure vessels located in Group B, F, H, M, R, S, and U occupancies having a volume of 5 cubic feet or less and operated at pressures not exceeding 250 psi.
4. Small unfired pressure vessels. Regardless of occupancy, unfired pressure vessels that are:
a. less than 1 ½ cubic feet in volume, (approx. 11.25 gallons).
b. 6 inches in internal diameter with no limit as to length or pressure.
5. Pressure relief protected. Unfired pressure vessels of any size that are protected by approved pressure relief devices set to operate at a pressure not exceeding 15 psi or otherwise open to ambient atmospheric pressure.
6. DOT inspected. Any boiler or pressure vessel subject to regular inspection by federal inspectors or licensed by federal authorities, such as D.O.T.
7. Certain electric boilers. Electric boilers that meet all of the following criteria:
a. Having a vessel volume not exceeding 1 ½ cubic feet; and
b. Having a maximum allowable working pressure of one hundred (100) psi; and
c. If constructed after June 10, 1994, the boiler was constructed to American Society of Mechanical Engineers Boiler and Pressure Vessel Code standards, or listed or otherwise certified by a nationally recognized testing agency or recognized foreign testing laboratory.
8. Storage tanks. Water storage tanks with no air cushion and no energy or heat source.
9. State Owned. Boilers and pressure vessels under the direct ownership and operation of the State of Washington, and that are inspected in accordance with Washington State Boiler and Pressure Vessel rules (chapter 70.79 RCW) and in possession of a current Washington State Certificate to Operate.
10. Group R and U occupancies. Steam heating boilers, low-pressure hot water heating boilers, hot-water-supply boilers, and pressure vessels in Group R occupancies of less than six units and in Group U occupancies.

5.3 In-service inspection frequency. Inspection frequency shall, at a minimum, be as required by this Section 5.3. At the discretion of the inspector and as warranted by equipment conditions, the internal, external, or ultrasonic (UT) inspection frequency may be increased until the inspector is satisfied that conditions are corrected and that the minimum prescribed frequencies of inspection may resume.

5.3.1 External inspections.
A. Boiler inspections. Boilers are inspected externally annually. All required boiler controls and safety devices are tested during the external inspection to determine that they are operating properly.
B. Unfired pressure vessel inspections. Unfired pressure vessels are inspected externally biennially.
C. Potable water heaters and pool heaters. In Group A, E, and I occupancies, potable water heaters, combination water heaters (fired, electric, thermal, solar, and indirect), and pool heaters shall be inspected externally biennially for safe condition. The safety inspection consists of lifting the safety relief try-lever to verify free flow of the safety relief valve and of a visual inspection of the exterior of the vessel for leakage or physical damage.

5.3.2 Internal Inspections. Boilers are subject to internal inspection as follows:

A. Annual inspections. High pressure boilers are inspected internally annually.

B. Biennial inspections.

1. Low pressure steam boilers shall be inspected internally at least once every two years.
2. Unfired pressure vessels, when subject to corrosion and where construction allows, are inspected internally at least once every two years. Subject to the discretion of the inspector, an ultrasonic examination of the external side of the pressure vessel may substitute for an internal inspection.

C. Quadrennial inspections. Low pressure hot water heating boilers not using corrosion inhibitors are inspected internally at least once every four years.

D. Discretionary inspections. Low pressure hot water heating boilers using corrosion inhibitors, glycol, or oil are inspected internally at a frequency determined by the inspector. The inspector shall consider factors including, but not limited to, history of the installation, adequacy of corrosion inhibitors, and tightness of the system.

5.4 Preparation for Inspection.

5.4.1 Boiler preparation. The owner or user shall prepare a boiler for internal inspection as necessary to allow for a meaningful inspection.

A. Preparation shall include the following unless directed otherwise by the boiler inspector:

1. Water shall be drained and the boiler thoroughly cleaned.
2. Manhole and handhole plates and wash-out plugs and water column connections shall be removed.
3. Furnace and combustion chambers shall be thoroughly cooled and cleaned.
4. All grates of internally fired boilers shall be removed.
5. Brickwork or refractory shall be removed, if needed, to determine the condition of the boiler headers, furnace, supports or other parts.
6. Leakage of steam or hot water into the boiler shall be prevented while it is open for inspection.
7. Low water cutout shall be disassembled as necessary to allow for inspection.
8. Compliance with any lock-out or tag-out and confined space entry procedures shall be followed if required by the owner, operator, OSHA, WDOSH rules, and other regulations applying to the safety of personnel.

B. Unprepared. If a boiler or unfired pressure vessel has not been properly prepared for an internal inspection, the inspector may decline to make the inspection or test. The Certificate of Inspection will be withheld until the owner or user complies with the inspector's requirements. At the discretion of the inspector, an additional inspection fee may be charged per the Fee Subtitle, Seattle Municipal Code, Title 22, Subtitle IX, Permit Fees.

5.5 Inspection results - Corrections required. The inspector shall notify the owner or authorized representative of defects and deficiencies. It is the responsibility of the owner to promptly and properly make the corrections required by the inspector. If such corrections are not made, or if the operation of the boiler or pressure vessel is deemed unsafe by the inspector, the Certificate of Inspection for the boiler or pressure vessel may be withheld until the corrections are made.

5.6 Inspection by authorized insurance companies. Inspection of boilers and pressure vessels may be made by employees of an authorized insurance company. Such inspection shall be conducted in accordance with the requirements of this code by persons holding an active commission from the National Board of Boiler and Pressure Vessel Inspectors.

5.6.1. Inspector list. Authorized insurance companies must annually notify the code official, in writing, of those inspectors that will be conducting inspections within The City of Seattle. Notification shall include the National Board Commission number and expiration date of the inspectors' current National Board Commission. Notification in writing may be on company letterhead or by email. Authorization is subject to the approval of the code official.

5.6.2. Reports. Authorized insurance inspectors shall make their reports to the code official on forms or as prescribed by the Department.

5.6.3. Suspension of coverage. Authorized insurance inspectors shall immediately notify the code official of any suspension of insurance coverage.

5.6.4. New or discontinued coverage. Authorized insurance companies providing insurance coverage of equipment subject to inspection by the code official shall notify the code official within 30 days of any new insurance in effect or any discontinuance of insurance coverage of that equipment.

5.7 Certificate of inspection. It is unlawful to operate any boiler or pressure vessel without first obtaining a valid Certificate of Inspection from the code official. Certificates of Inspection shall be displayed in a conspicuous place adjacent to the boiler or vessel and a copy placed in the service manual. The Certificate of Inspection shall not be issued until the equipment passes inspection and is approved by the code official. A grace period of no longer than 60 days past the expiration date of a Certificate of Inspection may be granted.

5.8 Removal from service due to dangerous conditions. If the operation of a boiler or pressure vessel is deemed by the code official to constitute an imminent hazard, the pressure on such boiler or pressure vessel shall be relieved and the boiler or pressure vessel shall be secured at the owner's expense. The unsafe boiler or pressure vessel shall not be operated without approval of the code official, who may issue an emergency order pursuant to Section 1.6.7.

5.9 Operation of boilers and pressure vessels.

5.9.1. Operation. Boilers and pressure vessels shall be operated and maintained by an appropriately licensed boiler operator as required by the Seattle Steam Engineer and Boiler Fireman License Law, Seattle Municipal Code Chapter 6.420.

5.9.2. Maintenance. Boilers and pressure vessels shall be operated and maintained in a safe condition as required by the code official and in accordance with this code and nationally recognized standards. All safety devices, controls, and appurtenances shall be maintained and

cared for throughout the life of the boiler or pressure vessel. When the devices are deemed to be non-functioning, they shall be immediately replaced or repaired, and the vessel made whole and safe to operate.

5.10 Accidents are required to be reported. In case of an explosion or other event rendering a boiler or pressure vessel unsafe to return to operation, notice shall be given immediately to the code official. No boiler or unfired pressure vessel nor any parts shall be removed or disturbed before an inspection is made by a city inspector, except as necessary to prevent injury. The code official shall conduct an investigation to determine the cause of the accident and to recommend actions to prevent future occurrences.

Section 6 - Repairs and alterations

6.1 Repairs and alterations of boilers and pressure vessels.

6.1.1. Pre-approval. Repairs and alterations to in-service boilers and pressure vessels must be approved by the code official prior to proceeding with the repair or alteration and require a permit.

Exception: Routine Repairs, as defined by the National Board Inspection Code Part 3, Repairs and Alterations, do not require a permit.

6.1.2. Code compliance. Repairs or alterations to pressure-retaining portions of the boiler or pressure vessel shall comply with the current edition of this code and the National Board Inspection Code (NBIC) Part 3, Repairs and Alterations. If there are conflicts between the two codes, this code applies.

6.1.3. Notification. The in-service inspector shall be notified of the nature of the repair or alteration and kept apprised of the progress of the work.

6.1.4. Approval. The Repair Inspector shall conduct the final inspection and accept the repair or alteration as satisfactory before the boiler or pressure vessel is returned to service. Routine Repairs do not require a final inspection.

6.1.5. Documentation. Upon completion of the required documentation, the Repair Organization shall submit a copy to the code official.

Section 7 - Retroactive requirements

7.1 Retroactive requirements. The following requirements apply to all boilers and pressure vessels whether new or existing:

A. Every power hot water boiler, other than manually fired, shall be equipped with at least two temperature controls wired in series.

B. Every steam heating boiler, other than manually fired, shall be equipped with at least two pressure controls and a low-water cutoff.

C. Each temperature or pressure control shall have an independent sensing element.

D. Every mechanically fired boiler that requires manual ignition of the burner shall have a manual reset device to prevent automatic recycling of the ignition in the event of any shut down.

CHAPTER 1

SCOPE AND ADMINISTRATION

Note: Chapter 1 is entirely Seattle amendments to the *International Building Code* and is not underlined.

SECTION 101
TITLE, PURPOSE AND SCOPE

101.1 Title. This subtitle shall be known as the "Seattle Building Code," may be so cited, and is referred to herein as "this code."

101.2 Scope. This code applies to the construction and occupancy of any building or structure within the City. Repair, alteration, *change of occupancy*, addition to, relocation and maintenance of buildings and structures shall comply with this code as required by the International Existing Building Code. This code applies to *unsafe* buildings, structures, equipment and premises. See Chapter 32 for regulation of structures located on, over or under public property or a public right of way.

Exceptions:

1. Detached one- and two-family *dwellings* and multiple single-family *dwellings* (townhouses) not more than three *stories above grade plane* in height with a separate means of egress, and their accessory structures not more than three *stories above grade plane* in height, shall comply with the *International Residential Code*.
2. This code does not apply to public utility towers and poles, mechanical equipment not specifically regulated in this code, construction equipment and structural components thereof, and hydraulic flood control structures.

101.2.1 Existing buildings. The International Existing Building Code applies to the repair, alteration, *change of occupancy*, addition to, relocation and maintenance of *existing buildings*.

101.3 Applicability of city laws. A building permit application shall be considered under applicable city law in effect on the date a valid and fully complete building permit application is submitted or on a date as otherwise required by law.

Exception: For any project for which an associated, unexpired master use permit has been issued, a building permit application shall be considered under the versions of Seattle Municipal Code Title 23, Seattle *Land Use Code*; Seattle Municipal Code Chapter 25.09, Environmentally Critical Areas regulations; and Seattle Municipal Code Chapter 25.09, Tree Protection regulations in effect on the date established by Seattle Municipal Code Section 23.76.026 or 23.76.032.C.1 for consideration of the master use permit, unless that date is later than the date of the complete building permit application. This exception does not apply to a subdivision or short subdivision component of a master use permit.

Note: Applicable city law includes but is not limited to the Seattle Municipal Code Title 23, Seattle *Land Use Code*; Seattle Municipal Code Chapter 25.09, Environmentally Critical Areas regulations; Seattle Municipal Code Chapter 25.09, Tree Protection regulations; and the Seattle Building, Mechanical, Fuel Gas, Energy, Stormwater, Grading and Side Sewer codes.

101.3.1 Complete building permit applications. A building permit application is complete if the *building official* determines it meets the requirements of Sections 106.5.1 through 106.5.7, and the application includes, without limitation, the *construction documents* for the architectural and structural components of the building.

Exception: If the *building official* allows a building permit application to be submitted in phases for portions of a building, each phased portion submittal shall meet the requirements of Sections 106.5.1 through 106.5.7 applicable to the scope of the allowed phased portion, and the building permit application shall be considered complete for the purposes of Section 101.3 on the date the phased portion submittal that includes the structural frame for the entire building is submitted.

101.3.2 Initial tenant improvements. Complete permit applications for the initial tenant alterations submitted no later than 18 months after the date of the *approved* final inspection for the building shall be considered under the codes applicable to the permit application for the building in accordance with Section 101.3.

Complete permit applications for initial tenant alterations submitted more than 18 months after the date of the *approved* final inspection for the building shall comply with the codes in effect at the time of application.

101.4 Purpose. The purpose of this code is to provide minimum standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, quality of materials, occupancy, location and maintenance of buildings and structures within the City and certain equipment specifically regulated herein. The purpose of this code is to provide for and promote the health, safety and welfare of the general public, and not to create or otherwise establish or designate any particular class or group of *persons* who will or should be especially protected or benefited by the terms of this code.

101.5 Internal consistency. Where in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive governs. Where there is a conflict between a general requirement and a specific requirement, the specific requirement governs.

101.6 Referenced codes and standards. The codes and standards referenced in this code are considered part of this code to the extent prescribed by each such reference. If differences occur between provisions of this code and referenced codes and standards, the provisions of this code apply, except that nothing in this code limits the effect of any provision of the Grading Code, Stormwater Code, or Regulations for Environmentally Critical Areas.

101.7 Appendices. Provisions in the appendices of the *International Building Code* do not apply unless specifically adopted.

101.8 Metric units. Wherever in this code there is a conflict between metric units of measurement and U.S. customary units, the U.S. customary units govern.

SECTION 102
UNSAFE BUILDINGS, STRUCTURES OR PREMISES

102.1 Emergency order. Whenever the *building official* finds that any building or structure or premises, or portion thereof is in such a dangerous and *unsafe* condition as to constitute an imminent hazard to life or limb, the *building official* may issue an emergency order. The emergency order may (1) direct that the building, structure or premises, or portion thereof be restored to a safe condition by a date certain; (2) require that the building, structure or premises, or portion thereof, be vacated within a reasonable time to be specified in the order, or in the case of extreme danger, may specify immediate vacation of the building, structure or premises, or portion thereof; or (3) authorize immediate disconnection of the utilities or energy source.

102.1.1 Service of emergency order. The order shall be posted on the premises or personally served on the owner of the building or premises or any *person* responsible for the condition. The order shall specify the time for compliance.

102.1.2 Effect of emergency order. No *person* may occupy a building, structure or premises, or portion thereof, after the date on which the building is required to be vacated until the building, structure or premises, or portion thereof, is restored to a safe condition as required by the order and this code. It is a violation for any *person* to fail to comply with an emergency order issued by the *building official*.

102.2 Hazard correction order. Whenever the *building official* finds that an *unsafe* building, structure or premises exists, the *building official* may issue a hazard correction order specifying the conditions causing the building, structure or premises to be *unsafe* and directing the owner or other *person* responsible for the *unsafe* building, structure or premises to correct the condition by a date certain. In lieu of correction, the owner may submit a report or analysis to the *building official* analyzing said conditions and establishing that the building, structure or premises is, in fact, safe. The *building official* may require that the report or analysis be prepared by a licensed engineer and may require compliance with the International Existing Building Code.

102.2.1 Service of hazard correction order. The order shall be served upon the owner, agent or other responsible *person* by personal service or regular first class mail addressed to the last known address of such *person* or if no address is available after reasonable inquiry, the order may be posted in a conspicuous place on the premises. The order may also be posted if served by personal service or first class mail.

102.2.2 Effect of hazard correction order. It is a violation for any *person* to fail to comply with a hazard correction order as specified in this subsection.

SECTION 103
ENFORCEMENT, VIOLATIONS AND PENALTIES

103.1 Violations. It is a violation of this code for any *person* to:

1. Erect, construct, enlarge, repair, move, improve, remove, convert, demolish, equip, occupy, inspect or maintain any building or structure, or cause or permit the same to be done, in the City, contrary to or in violation of any of the provisions of this code;
2. Knowingly aid, abet, counsel, encourage, hire, induce or otherwise procure another to violate or fail to comply with this code;
3. *Use* any material or to install any device, appliance or equipment that does not comply with applicable standards of this code or that has not been approved by the *building official*;
4. Violate or fail to comply with any order issued by the *building official* pursuant to the provisions of this code or with any requirements of this code;
5. Remove, mutilate, destroy or conceal any notice or order issued or posted by the *building official* pursuant to the provisions of this code, or any notice or order issued or posted by the *building official* in response to a natural disaster or other emergency;

6. Conduct work under a permit without requesting an inspection as required by Section 108.

103.2 Notice of violation. If, after investigation, the *building official* determines that standards or requirements of this code have been violated or that orders or requirements have not been complied with, the *building official* may issue a notice of violation upon the owner, agent, or other *person* responsible for the action or condition. The notice of violation shall state the standards or requirements violated, shall state what corrective action, if any, is necessary to comply with the standards or requirements, and shall set a reasonable time for compliance.

103.2.1 Service of notice of violation. The notice shall be served upon the owner, agent or other responsible *person* by personal service or regular first class mail addressed to the last known address of such *person* or if no address is available after reasonable inquiry, the notice may be posted in a conspicuous place on the premises. The notice may also be posted if served by personal service or first class mail. Nothing in this section limits or precludes any action or proceeding to enforce this code, and nothing obligates or requires the *building official* to issue a notice of violation prior to the imposition of civil or criminal penalties.

103.2.2 Review of notice of violation by the building official. Any *person* affected by a notice of violation issued pursuant to Section 103.2 may obtain a review of the notice by making a request in writing to the *building official* within ten days after service of the notice. When the last day of the period computed is a Saturday, Sunday, or city holiday, the period runs until 5 p.m. of the next business day.

103.2.2.1 Review procedure. The review shall occur not less than ten nor more than 20 days after the request is received by the *building official* unless otherwise agreed to by the *person* requesting the review. Any *person* affected by the notice of violation may submit additional information to the *building official*. The review shall be made by a representative of the *building official* who will review any additional information that is submitted and the basis for issuance of the notice of violation. The reviewer may request clarification of the information received and a site visit.

103.2.2.2 Decision. After the review, the *building official* shall:

1. Sustain the notice;
2. Withdraw the notice;
3. Amend the notice; or
4. Continue the review to a date certain.

103.2.2.3 Order. The *building official* shall issue an order containing the decision within 15 days of the date that the review is completed and shall cause the order to be mailed by regular first class mail to the *persons* requesting the review and the *persons* named on the notice of violation, addressed to their last known addresses.

103.3 Stop work orders. The *building official* may issue a stop work order whenever any work is being done contrary to the provisions of this code or contrary to a permit issued by the *building official*, or in the event of dangerous or *unsafe* conditions related to construction or demolition. The stop work order shall identify the violation and may prohibit work or other activity on the site.

103.3.1 Service of stop work order. The *building official* shall serve the stop work order by posting it in a conspicuous place at the site. If posting is not physically possible, the stop work order may be served by personal service or by regular first class mail to the last known address of: the property owner, the *person* doing or causing the work to be done, or the holder of a permit if work is being stopped on a permit. For purposes of this section, service is complete at the time of posting or of personal service, or if mailed, three days after the date of mailing. When the last day of the period so computed is a Saturday, Sunday or city holiday, the period runs until 5 p.m. on the next business day.

103.3.2 Effective date of stop work order. Stop work orders are effective when posted, or if posting is not physically possible, when one of the *persons* identified in Section 103.3.1 is served.

103.3.3 Review of stop work orders by the building official. Any *person* aggrieved by a stop work order may obtain a review of the order by delivering to the *building official* a request in writing within two business days of the date of service of the stop work order.

103.3.3.1 Review procedure. The review shall occur within two business days after receipt by the *building official* of the request for review unless otherwise agreed by the *person* making the request. Any *person* affected by the stop work order may submit additional information to the *building official* for consideration as part of the review at any time prior to the review. The review will be made by a representative of the *building official* who will review all additional information received and may also request a site visit.

103.3.3.2 Decision. After the review, the *building official* may:

1. Sustain the stop work order;
2. Withdraw the stop work order;
3. Modify the stop work order; or

4. Continue the review to a date certain.

103.3.3.3 Order. The *building official* shall issue an order containing the decision within two business days after the review is completed and shall cause the order to be sent by regular first class mail to the *person* or *persons* requesting the review, any *person* on whom the stop work order was served, and any other *person* who requested a copy before issuance of the order, addressed to their last known address.

103.4 Occupancy violations. Whenever any building or structure is being occupied contrary to the provisions of this code, the *building official* may order such occupancy discontinued and the building or structure, or portion thereof, vacated by notice.

103.4.1 Service of notice of occupancy violation. The notice of occupancy violation shall be served upon the owner, agent or other responsible *person* by personal service or regular first class mail addressed to the last known address of such *person* or if no address is available after reasonable inquiry, the notice may be posted in a conspicuous place on the premises. The notice may also be posted if served by personal service or first class mail.

103.4.2 Compliance with notice of occupancy violation. Any *person* occupying the building or structure shall discontinue the occupancy by the date specified in the notice of the *building official*, or shall make the building or structure, or portion thereof, comply with the requirements of this code; provided, however, that in the event of an *unsafe* building, Section 102 may apply.

103.5 Civil penalties. Any *person* violating or failing to comply with the provisions of this code shall be subject to a cumulative civil penalty in an amount not to exceed $500 per day for each violation from the date the violation occurs or begins until compliance is achieved, except that the penalty for violations of Section 3107.4.1 shall be $1500 per day. In cases where the *building official* has issued a notice of violation, the violation will be deemed to begin, for purposes of determining the number of days of violation, on the date compliance is required by the notice of violation.

103.6 Enforcement in Municipal Court. Civil actions to enforce Title 22 of the Seattle Municipal Code (SMC) shall be brought exclusively in Seattle Municipal Court, except as otherwise required by law or court rule. In any civil action for a penalty, the City has the burden of proving by a preponderance of the evidence that a violation exists or existed; the issuance of a notice of violation or of an order following a review by the *building official* is not itself evidence that a violation exists.

103.7 Judicial review. Because civil actions to enforce Title 22 SMC must be brought exclusively in Seattle Municipal Court pursuant to Section 103.6, orders of the *building official* including Notices of Violation issued under this chapter are not subject to judicial review pursuant to Chapter 36.70C RCW.

103.8 Alternative criminal penalty. Anyone who violates or fails to comply with any notice of violation or order issued by the *building official* pursuant to this code or who removes, mutilates, destroys or conceals a notice issued or posted by the *building official* shall, upon conviction thereof, be punished by a fine of not more than $5000 or by imprisonment for not more than 365 days, or by both such fine and imprisonment for each separate violation. Each day's violation shall constitute a separate offense.

103.9 Additional relief. The *building official* may seek legal or equitable relief to enjoin any acts or practices and abate any condition when necessary to achieve compliance.

103.10 Administrative review by the building official. Prior to issuance of the building permit, applicants may request administrative review by the *building official* of decisions or actions pertaining to the administration and enforcement of this code. Requests shall be addressed to the *building official*.

103.11 Administrative review by the Construction Codes Advisory Board. After administrative review by the *building official*, and prior to issuance of the building permit, applicants may request review of decisions or actions pertaining to the application and interpretation of this code by the Construction Codes Advisory Board, except for stop work orders, notices of violations, revocations of permits, and enforcement of Section 3107. The review will be performed by three or more members of the Construction Codes Advisory Board, chosen by the Board Chair. The Chair shall consider the subject of the review and members' expertise when selecting members to conduct a review. The decision of the review panel is advisory only; the final decision is made by the *building official*.

103.12 Recording of notices. The *building official* may record a copy of any order or notice with the Department of Records and Elections of King County.

103.13 Appeal to Superior Court. Final decisions of the Seattle Municipal Court on enforcement actions authorized by Title 22 and this code may be appealed pursuant to the Rules for Appeal of Decisions of Courts of Limited Jurisdiction.

SECTION 104
ORGANIZATION AND DUTIES

104.1 Jurisdiction of Department of Construction and Inspections. The Department of Construction and Inspections is authorized to administer and enforce this code. The Department of Construction and Inspections is under the administrative and operational control of the Director, who is the *building official*.

104.2 Designees. The *building official* may appoint such officers, inspectors, assistants and employees as are authorized from time to time. The *building official* may authorize such employees and other agents as may be necessary to carry out the functions of the *building official*.

104.3 Right of entry. With the consent of the owner or occupier of a building or premises, or pursuant to a lawfully issued warrant, the *building official* may enter a building or premises at any reasonable time to perform the duties imposed by this code.

104.4 Modifications. The *building official* may modify the requirements of this code for individual cases provided the *building official* finds: (1) there are practical difficulties involved in carrying out the provisions of this code; (2) the modification is in conformity with the intent and purpose of this code; and (3) the modification will provide a reasonable level of strength, effectiveness, fire resistance, durability, safety and sanitation when considered together with other safety features of the building or other relevant circumstances. The *building official* may, but is not required to, record the approval of modifications and any relevant information in the files of the *building official* or on the *approved construction documents*.

104.5 Alternate materials, methods of construction and design. This code does not prevent the *use* of any material, design or method of construction not specifically allowed or prohibited by this code, provided the alternate has been approved and its use authorized by the *building official*. The *building official* may approve an alternate, provided the *building official* finds that the proposed alternate complies with the provisions of this code and that the alternate, when considered together with other safety features of the building or other relevant circumstances, will provide at least an equivalent level of strength, effectiveness, fire resistance, durability, safety and sanitation. Certain code alternates have been pre-approved by the *building official* and are identified in this code as numbered code alternates. The *building official* may require that sufficient evidence or proof be submitted to reasonably substantiate any claims regarding the use or suitability of the alternate. The *building official* may, but is not required to, record the approval of code alternates and any relevant information in the files of the *building official* or on the *approved construction documents*.

104.6 Flood hazard areas. The *building official* shall not grant modifications to any provision required in flood hazard areas as established by Section 1612.3 unless a determination has been made that:

1. A showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the site render the elevation standards of Section 1612 inappropriate.
2. A determination that failure to grant the variance would result in exceptional hardship.
3. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, cause fraud on or victimization of the public, or conflict with existing laws or ordinances.
4. A determination that the variance is the minimum necessary to afford relief, considering the flood hazard.
5. Submission to the applicant of written notice specifying the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the design flood elevation increases risks to life and property.

104.7 Tests. Whenever there is insufficient evidence of compliance with any of the provisions of this code or evidence that any material or construction does not conform to the requirements of this code, the *building official* may require tests as proof of compliance to be made at no expense to the City. Test methods shall be specified by this code or by other recognized test standards. If there are no recognized and accepted test methods for the proposed alternate, the *building official* shall determine the test procedures. All tests shall be made by an *approved agency*. Reports of such tests shall be retained by the *building official* for the period required for retention of public records.

104.8 Rules of the building official. The *building official* has authority to issue interpretations of this code and to adopt and enforce rules and regulations supplemental to this code as may be deemed necessary in order to clarify the application of the provisions of this code. Such interpretations, rules and regulations shall be in conformity with the intent and purpose of this code.

104.8.1 Procedure. The *building official* shall promulgate, adopt and issue rules according to the procedures specified in the Administrative Code, Chapter 3.02 of the Seattle Municipal Code.

104.9 Liability. Nothing in this code is intended to be nor shall be construed to create or form the basis for any liability on the part of the City, or its officers, employees or agents, for any injury or damage resulting from the failure of a building to conform to the provisions of this code, or by reason or as a consequence of any inspection, notice, order, certificate, permission or approval authorized or issued or done in connection with the implementation or enforcement of this code, or by reason of any action or inaction on the part of the City related in any manner to the enforcement of this code by its officers, employees or agents.

This code shall not be construed to relieve or lessen the responsibility of any *person* owning, operating or controlling any building or structure for any damages to *persons* or property caused by defects, nor shall the Department of Construction and Inspections or the City of Seattle be held to have assumed any such liability by reason of the inspections authorized by this code or any permits or certificates issued under this code.

104.10 Responsibilities of parties.

104.10.1 Responsibility for compliance. Compliance with the requirements of this code is the obligation of the owner of the building, structure, or premises, the duly authorized agent of the owner, and other *persons* responsible for the condition or work, and not of the City or any of its officers, employees or agents.

104.10.2 Responsibilities of registered design professional in responsible charge. It is the responsibility of the *registered design professional in responsible charge* to ensure that the information in the *construction documents* is complete, accurate, and, to the best of the design professional's knowledge, conforms to the requirements of this code.

104.10.3 Responsibilities of structural engineer in responsible charge. It is the responsibility of the *structural engineer in responsible charge* to:

1. Design the primary structure;

   Exception: A licensed engineer other than the *structural engineer in responsible charge* may design the primary structure of single-*story* metal buildings.
2. Specify design loads, configurations, controlling dimensions, deflection limits and/or other criteria necessary for the design of secondary structural components and sub-systems and the selection of *structurally qualified products*;
3. Determine the adequacy and conformance of the application of the *structurally qualified products* with the design intent of the City-approved *construction documents*;
4. Review for compatibility with the City-approved *construction documents* previously approved by the *building official*, the *deferred submittals* for the primary structural frame and the design and *deferred submittals* for *secondary members* for the following structural elements:

Wood trusses	Glu-lam beams
Steel joists	Structural steel
Steel decking	Prefabricated stair systems
Precast concrete piles	Post-tensioned floor systems
Curtain wall systems	Precast prestressed planks
Major skylight frames	Precast concrete/masonry wall panels

The *building official* may approve additions to, or deletions from this list for specific projects. If there is no *structural engineer in responsible charge* on the project, the architect in responsible charge shall assume these responsibilities.

Note: *"Primary structural frame"* and *"secondary member"* are defined in Chapter 2.

104.10.4 Responsibilities of contractor. It is the responsibility of the contractor to perform all the work in conformance with the City-approved *construction documents*.

104.10.5 Responsibilities of plans examiner. It is the responsibility of the plans examiner to verify that the description of the work in the *construction documents* is substantially complete, and to require corrections where, to the best of the plans examiner's knowledge, the *construction documents* do not conform to this code or other pertinent laws and ordinances.

104.10.6 Responsibilities of field inspector. It is the responsibility of the field inspector to conduct inspections to verify that the work in progress conforms with the *approved construction documents* and to require corrections where, to the best of the field inspector's knowledge, the work either does not conform to the *construction documents* or where the work is in violation of this code or other pertinent laws and ordinances.

SECTION 105
CONSTRUCTION CODES ADVISORY BOARD

105.1 Establishment. There is a "Construction Codes Advisory Board" ("Board") consisting of 13 voting members, appointed by the Mayor and subject to confirmation by the City Council. The Board membership consists of one representative of each of the following professions or organizations. The representative of a profession need not be a member of the profession but may be a representative of an organization of such professionals.

1 architect;

1 structural engineer;

1 electrical engineer;

1 heating, refrigeration and air-conditioning engineer;

1 general contractor;

1 electrical contractor;

1 commercial building owner or operator;

1 apartment building owner or operator;

1 developer and/or contractor of residential projects;

1 member of organized labor; and

3 members of the general public.

A representative of each of the following departments shall be ex officio, non-voting members of the Board:

Seattle Fire Department;

Seattle City Light; and

Seattle-King County Department of Public Health.

105.2 Duties of Board. The Board shall act in an advisory capacity for all of its duties. The Board shall meet on call either by the *building official* or the Board Chair, subject to timely notice.

105.2.1 Code adoption and amendment. The Board may examine proposed new editions and amendments to the following codes and regulations listed in this section. The Board may make recommendations to the *building official* and to the City Council for adoption and amendment of these codes.

Seattle Building Code – Chapter 22.100 SMC*

Seattle Residential Code – Chapter 22.150 SMC

Seattle Mechanical Code – Chapter 22.400 SMC

Seattle Fuel Gas Code – Chapter 22.420 SMC

Seattle Boiler Code – Chapter 22.450 SMC

Seattle Energy Code – Chapter 22.700 SMC

Seattle Electrical Code – Chapter 22.300 SMC

Seattle Plumbing Code – SMC Title 22 Subtitle V

* SMC is the Seattle Municipal Code.

105.2.2 Review of director's rules. The Board may examine proposed administrative rules relating to the codes and regulations listed above and make recommendations to the *building official*.

105.3 Organization. The Board shall organize, and elect a chair and any other officers as may be established by the Board. The Board may adopt rules of procedure. There shall be a committee of the Board for each code assigned to its review. Committees shall consist of Board members and may include additional members such as other representatives of the general public and professions not specifically represented on the Board. Any non-Board members of committees shall be appointed by the Chair. The Chair may, from time to time, appoint special topic subcommittees.

105.4 Terms of service. Terms of Board members are three years, dating from the day of expiration of the preceding term; provided, a member whose term has expired shall continue to serve until a successor is appointed and confirmed. Terms on the Board shall be staggered so that the terms of not more than five positions expire concurrently. Vacancies shall be filled for any unexpired term in the same manner as the original appointment.

105.5 Removal of Board member. A member may be removed by the Mayor, subject to a majority vote of members of the City Council.

105.6 Compensation of Board members. No member shall receive any compensation for service on the Board.

SECTION 106
BUILDING PERMITS

106.1 Permits required. Except as otherwise specifically provided in this code, a building permit shall be obtained from the *building official* for each building or structure prior to erecting, constructing, enlarging, altering, repairing, moving, improving, removing, changing the occupancy of, or demolishing such building or structure, or allowing the same to be done. All work shall comply with this code, even where no permit is required.

106.2 Work exempt from permit. A building permit is not required for the work listed below. Exemption from the permit requirements of this code does not authorize any work to be done in any manner in violation of this code or any other laws or ordinances of the City.

1. Minor repairs or alterations if the value of construction, as determined by the *building official*, is $6,000 or less in any six month period. Such repairs and alterations shall not include the removal, reduction, alteration, or relocation of any load-bearing support. Egress, light, ventilation, and fire-resistance shall not be reduced without a permit.
2. Minor work including the following, provided no changes are made to the building envelope: patio and concrete slabs on grade, painting or cleaning a building, repointing a chimney, installing kitchen cabinets, paneling or other surface finishes over existing wall and ceiling systems applied in accordance with Chapter 8, insulating *existing buildings*, abatement of hazardous materials, demolition of nonstructural interior tenant improvements in retail and office uses, and in-kind or similar replacement of or repair of deteriorated members of a structure.
3. One-*story* detached accessory buildings used for greenhouse, tool or storage shed, playhouse, or similar uses, if:
   - 3.1 The projected roof area does not exceed 120 square feet; and
   - 3.2 The building is not placed on a concrete foundation other than a slab on grade.
4. Fences not over 8 feet high that do not have masonry or concrete elements above 6 feet.
5. Arbors and other open-framed landscape structures not exceeding 120 square feet in projected area.
6. Display cases, cabinets, counters and partitions not over 5 feet 9 inches high.
7. Retaining walls and rockeries which are not over 4 feet in height measured from the bottom of the footing to the top of the wall, if:
   - 7.1 There is no surcharge or impoundment of Class I, II or III-A liquids.
   - 7.2 The wall or rockery is not located in an Environmentally Critical Area (ECA) or ECA buffer pursuant to chapter 25.09 of the Seattle Municipal Code;
   - 7.3 Construction does not support soils in a steep slope area, potential landslide area or known slide area as identified in the Seattle Environmentally Critical Areas Ordinance Section 25.09.020 of the Seattle Municipal Code.
   - 7.4 Possible failure would likely cause no damage to adjoining property or structures.
8. Platforms, walks and driveways not more than 18 inches above grade and not over any basement or *story* below.
9. Temporary motion picture, television and theater stage sets and scenery.
10. Window *awnings* supported by an exterior wall of Group R-3, and Group U occupancies when projecting not more than 54 inches.
11. Prefabricated swimming pools, spas and similar equipment accessory to a Group R-3 occupancy in which the pool walls are entirely above the adjacent grade and if the capacity does not exceed 5,000 gallons.
12. Replacement of siding. This shall not include structural changes, replacement of sheathing or alterations to doors and windows. See Energy Code Sections R503.1.1, Exceptions 2 and 3 and C503.1, Exceptions 3 and 4, for requirements for *existing buildings*.
13. Roof recover.
14 Roof replacement under either of the following conditions:
   - 14.1 In one- and two-family *dwellings* and townhouses if no changes are made to the building envelope other than adding or replacing insulation, and the insulation value is equivalent to or better than the *existing structure*; or
   - 14.2 Where less than 500 square feet of roof sheathing or insulation is exposed within any 6 month period. Permits are required for structural changes and replacement of sheathing of any size. See Energy Code Sections R503.1.1, C503.1 and C503.3 for insulation requirements for *existing buildings*.
15. School, park or private playground equipment including tree houses.
16. Removal and/or replacement of underground storage tanks that are subject to regulation by a state or federal agency.

Note: A Fire Department permit is required for removal, replacement and decommissioning of underground storage tanks.

17. Installation of dish and panel antennas 6.56 feet (2 m) or less in diameter or diagonal measurement.
18. Water tanks not located in Environmentally Critical Areas that are supported directly on grade if the capacity is not greater than 5,000 gallons (18 925 L) and the ratio of height to diameter or width is not greater than 2:1.

106.3 Other permits required. Unless otherwise exempted by this or other pertinent codes, separate master use, plumbing, electrical, mechanical and other permits may be required for the above exempted items.

106.4 Flood hazard areas. In addition to the permit required by this section, all work to be performed in areas of special flood hazard, as defined in Seattle Municipal Code Chapter 25.06, are subject to additional standards and requirements, including

floodplain development approval or a Floodplain Development License, as set forth in Chapter 25.06, the Seattle Floodplain Development Ordinance.

106.4.1 Determination of substantially improved or substantially damaged existing buildings and structures in flood hazard areas. For applications for reconstruction, rehabilitation, *repair*, *alteration*, *addition* or other improvement of *existing buildings* or structures located in *flood hazard areas*, the *building official* shall determine if the proposed work constitutes *substantial improvement* or *repair* of *substantial damage*. Where the *building official* determines that the proposed work constitutes *substantial improvement* or *repair* of *substantial damage*, and where required by this code, the *building official* shall require the building to meet the requirements of Section 1612.

106.5 Application for permit. To obtain a permit, the applicant shall first file an application a format determined by the *building official*. Every such application shall:

1. Identify and describe the work to be covered by the permit for which application is made.
2. Describe the land on which the proposed work is to be done by legal description, property address or similar description that will readily identify and definitely locate the proposed building or work.
3. Provide contractor's business name, address, phone number and current contractor registration number (required if contractor has been selected).
4. Be accompanied by *construction documents*, including plans and other data as required in Section 106.5.2 through 106.5.7.
5. State the valuation of any new building or structure or any addition, remodeling or alteration to an *existing building* including cost breakdown between additions and alterations.
6. Be signed by the owner of the property or building, or the owner's authorized agent, who may be required to submit evidence to indicate such authority.
7. Give such other data and information as may be required by the *building official*, including, but not limited to, master use and shoreline permits and building identification plans.
8. State the name of the owner and contractor and the name, address and phone number, of a contact *person*.
9. Substantially conform with applicable city law in effect on the date described in Section 101.3, as modified by any exception.
10. Applications that include a grading component shall include all information prescribed by the Grading Code and rules adopted thereunder, and all additional information required by the *building official* pursuant to the Grading Code and rules adopted thereunder.

106.5.1 Construction documents. *Construction documents* shall be submitted in two or more sets with each application for a permit, or shall be submitted in electronic format determined by the *building official*. Computations, stress diagrams, shop and fabrication drawings and other data sufficient to show the adequacy of the plans shall be submitted when required by the *building official*.

Exception: The *building official* may waive the submission of *construction documents*, if the *building official* finds that the nature of the work applied for is such that reviewing of *construction documents* is not necessary to obtain compliance with this code.

106.5.2 Preparation by registered design professionals. *Construction documents* for all work shall be prepared and designed by or under the direct supervision of an architect or structural engineer licensed to practice under the laws of the State of Washington. Each sheet of *construction documents* shall bear the seal and the signature of the registered design professional before the permit is issued.

Exceptions:

1. *Construction documents* for work not involving structural design are permitted to be prepared by a registered professional engineer or registered architect qualified in the proposed work.
2. When authorized by the *building official*, *construction documents* for assembly line products or designed specialty structural products may be designed by a registered professional engineer.
3. When authorized by the *building official*, *construction documents* need not be prepared by an engineer or architect licensed by the State of Washington for the following:

   3.1. Detached one- and two-family *dwellings*.

   3.2 New buildings or structures, and additions, alterations or repairs made to them of conventional light frame construction, if the value of construction, as determined by the *building official*, is less than $75,000.

   3.3. Nonstructural alterations and repairs if the value of construction, as determined by the *building official*, is less than $75,000, excluding the value of electrical and mechanical systems, fixtures, equipment, interior finish and millwork.

3.4. Other work as specified in rules promulgated by the *building official*.

106.5.3 Design professional in responsible charge. The *building official* is authorized to require the owner to engage and designate on the building permit application a registered design professional who shall act as the registered design professional in responsible charge. If the circumstances require, the owner shall designate a substitute registered design professional in responsible charge who shall perform the duties required of the original registered design professional in responsible charge. The *building official* shall be notified in writing by the owner if the registered design professional in responsible charge is changed or is unable to continue to perform the duties. The registered design professional in responsible charge is responsible for reviewing and coordinating submittal documents prepared by others, including phased and *deferred submittal* items, for compatibility with the design of the building.

106.5.4 Information required on construction documents. *Construction documents* shall include the following, as applicable:

1. A plot plan showing the width of streets, alleys, yards and courts.
2. The location (and/or location within a building), floor area, *story*, height, type of construction and occupancy classification as defined by the Building Code and use as defined by the *Land Use Code* of the proposed building and of every *existing building* on the property.
3. Where there are more than two buildings located on a property, a building identification plan identifying the location of each building on the property and identifying each building by a numbering system unrelated to address. Such plan is not required where a plan for the site is already on file and no new buildings are being added to the site.
4. Types of heating and air conditioning systems.
5. Architectural plans, including floor plans, elevations and door and finish schedules showing location of all doors, windows, mechanical equipment, shafts, pipes, vents and ducts. *Fire walls*, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall or horizontal assembly required to have protected openings or penetrations shall be identified on the architectural plans.
6. Structural plans, including foundation plan and framing plans.
7. Cross-sections and construction details for both architectural and structural plans including wall sections, foundation, floor and roof details, connections of structural members and types of construction material.
8. Topographic plans, including original and final contours, location of all buildings and structures on the site and, when required by the *building official*, adjacent to the site, and cubic yards of cut and fill.
9. If the *building official* has reason to believe that there may be an intrusion into required open areas or over the property line, a survey of the property prepared by a land surveyor licensed by the State of Washington is required for new construction, and for additions or accessory buildings.
10. If any building or structure is to be erected or constructed on property abutting an unimproved or partially improved street or alley, the plans shall also include a profile showing the established or proposed grade of the street or alley, based upon information obtained from the Director of Transportation relating to the proposed finished elevations of the property and improvements thereon.
11. Where design flood elevations are not specified, they shall be established in accordance with Section 1612.3.1.

106.5.5 Information on first sheet. The first or general note sheet of each set of plans shall specify the following, as applicable:

1. The building and street address of the work.
2. The name and address of the owner and *person* who prepared the plans.
3. Legal description of the property.
4. Occupancy classification(s) of all parts of the building(s) and where mixed use and occupancy applies, a diagram of the building or any portion thereof showing how the mixed uses/occupancies are “separated” or “non-separated” per Section 508.
5. Description of fixed fire protection devices or systems for each occupancy, or note “Full” when provided for the entire building.
6. Zoning classification of the property and existing and proposed uses of the structure(s) as defined in the *Land Use Code*.
7. Indication of location within the *fire district* as defined in this code, if applicable.
8. Type of construction as defined in this code.
9. Number of *stories above grade plane*, *mezzanines* and *basements* as defined in this code.
10. Variances, conditional uses, special exceptions, including project numbers, approval and approval extension dates.

11. Where applicable, a description of the design selected and approved at a Section 403 high-rise building pre-design conference, a Section 404 atrium pre-design conference, a Section 414.1.4 hazardous occupancy pre-design conference, a Section 1613.1.1 seismic design pre-design conference or a similar conference on a building subject to Fire Code Chapter 93.

106.5.6 Structural notes. Plans shall include applicable information including, but not limited to, the following:

1. Design loads: Snow load, live loads and lateral loads. If required by the *building official*, the structural notes for plans engineered to ASCE 7 shall include the factors of the base shear formula used in the design;
2. Foundations: Foundation investigations, allowable bearing pressure for spread footings, allowable load capacity of piles, lateral earth pressure;
3. Masonry: Type and strength of units, strength or proportions of mortar and grout, type and strength of reinforcement, method of testing, design strength;
4. Wood: Species or species groups, and grades of sawn lumber, glued-laminated lumber, plywood and assemblies, type of fasteners;
5. Concrete: Design strengths, mix designs, type and strength of reinforcing steel, welding of reinforcing steel, restrictions, if any;
6. Steel and aluminum: Specification types, grades and strengths, welding electrode types and strengths.

In lieu of detailed structural notes the *building official* may approve minor references on the plans to a specific section or part of this code or other ordinances or laws.

106.5.7 Fire-resistive notes. The *building official* may require that plans for buildings more than two *stories* in height of other than Groups R-3 and U occupancies indicate how required structural and fire-resistive integrity will be maintained where a penetration will be made for electrical, mechanical, plumbing and communication conduits, pipes and similar systems.

The *building official* may require that, when required for fire-resistive construction, the method of installation of wall and ceiling coverings and the protection of structural parts be specified on the plans unless the listing that documents the rating specifies a method no more restrictive than the minimum standards of Chapter 7.

106.5.8 Deferred submittals. Deferral of any submittal items shall have the prior approval of the *building official*. The registered design professional in responsible charge shall list *deferred submittals* on the plans for review by the *building official*.

Documents for *deferred submittal* items shall be submitted to the registered design professional in responsible charge who shall review them and forward them to the *building official* with a notation indicating that the *deferred submittal* documents have been reviewed and been found to be in general conformance to the design of the building. The *deferred submittal* items shall not be installed until the *deferred submittal* documents have been approved by the *building official*.

106.5.9 Construction and demolition waste. The information in Sections 106.5.9.1 and 106.5.9.2 shall be submitted for projects generating construction or demolition material for salvage, recycling or disposal. These requirements apply to building alterations having a work area greater than 750 square feet or a project value greater than $75,000, whichever is more restrictive, and for all whole building demolitions.

Exception: Projects for which an emergency order or hazard correction order has been issued pursuant to Section 102.

106.5.9.1 Salvage Assessment. This form shall be provided at the time of permit application and is a requirement for permit application submittal.

1. A salvage assessment completed by an approved agent identifying building components having potential to be salvaged prior to building removal. The building owner is permitted to complete the assessment for building alterations that include some demolition.
2. A statement of compliance with the regulations of the Puget Sound Clean Air Agency regarding asbestos identification, notification and abatement.

Exception: A salvage assessment is not required if the project does not impact an existing building, such as construction of a new detached accessory dwelling unit or backyard cottage.

106.5.9.2 Waste Diversion Report. A Waste Diversion Report shall be submitted within 60 days of final inspection approval. The Waste Diversion Report shall identify the weight or volume of project-generated construction waste and demolition material, the hauler of the material, and the receiving facility or location for each commodity. A signed affidavit from the receiving party and photo documentation shall be included for the salvaged materials for which a tip receipt cannot be obtained.

106.5.10 Clarity of plans. Plans shall be drawn to a clearly indicated and commonly accepted scale in a format determined by the *building official*.

106.6 Application review and permit issuance. The *construction documents* shall be reviewed by the *building official*. Such *construction documents* may be reviewed by other departments of the City to check compliance with the laws and ordinances under their jurisdiction.

106.6.1 Determination of completeness. Within 28 days after an application is filed, the *building official* shall notify the applicant in writing either that the application is complete or that it is not complete, and if not complete, what additional information is required to make it complete. Within 14 days after receiving the additional information, the *building official* shall notify the applicant in writing whether the application is now complete or what additional information is necessary. An application shall be deemed to be complete if the *building official* does not notify the applicant in writing by the deadlines in this section that the application is incomplete.

106.6.2 Decision on application. Except as provided in Section 106.6.8, the *building official* shall approve, condition or deny the application within 120 days after the *building official* notifies the applicant that the application is complete.

To determine the number of days that have elapsed after the notification that the application is complete, the following periods shall be excluded:

1. All periods of time during which the applicant has been requested by the Director to correct plans, perform required studies, or provide additional required information, until the determination that the request has been satisfied. The period shall be calculated from the date the *building official* notifies the applicant of the need for additional information until the earlier of the date the *building official* determines whether the additional information satisfies the request for information or 14 days after the date the information has been provided to the *building official*.
2. If the *building official* determines that the information submitted by the applicant under item 1 of this subsection is insufficient, the *building official* shall notify the applicant of the deficiencies, and the procedures under item 1 of this subsection shall apply as if a new request for information had been made;
3. All extensions of time mutually agreed upon by the applicant and the *building official*.

If a project permit application is substantially revised by the applicant, the time period shall start from the date at which the revised project application is determined to be complete under Section 101.3.1.

106.6.3 Issuance of permit.

106.6.3.1. Subject to Section 106.6.3.2, the *building official* shall issue a permit to the applicant if the *building official* finds the following:

1. The work described in the *construction documents* conforms to the requirements of this code and other pertinent laws, ordinances, and regulations and with all conditions imposed under any of them,
2. The fees specified in the *Fee Subtitle* have been paid, and
3. The applicant has complied with all requirements to be performed prior to issuance of a permit for the work under other pertinent laws, ordinances or regulations or included in a master use permit, or otherwise imposed by the *building official*.

When the permit is issued, the applicant or the applicant's authorized agent becomes the permit holder.

106.6.3.2 The *building official* shall not issue a permit if the *building official* has determined that the property owner violated subsection 22.210.136.A of the Seattle Municipal Code and the owner has not obtained any required tenant relocation license.

106.6.4 Phased permits.

1. The *building official* may authorize construction of a portion or portions of a building or structure before complete *construction documents* for the whole building or structure have been submitted or *approved*, or before the applicant has complied with all conditions of a building permit for the entire building or structure under the *Land Use Code* or master use permit. The entire proposed project shall comply with applicable city law in effect on the date set forth in Section 101.3.

   The applicant shall proceed at the applicant's risk without assurance that a permit for the entire building or structure will be granted.
2. After approval of a Master Use Permit as required by the *Land Use Code*, if the applicant has satisfied all applicable requirements for issuance of a grading permit under the Grading Code and rules adopted thereunder, a permit for excavation, shoring and other *land-disturbing activity* may be issued.

106.6.5 Grading permits. The grading component of the building permit is the portion of the building permit that authorizes work that is subject to the requirements of the Grading Code. That component constitutes a grading permit.

106.6.6 Permit conditions and denial. The *building official* may impose on a permit any conditions authorized by this code or other pertinent ordinances or regulations, including but not limited to the Grading Code, the Stormwater Code, Regulations for Environmentally Critical Areas, and rules adopted pursuant to those codes. In addition, the *building official* may condition

a permit in order to reduce the risks associated with development, construction, ownership and occupancy including, but not limited to risks in potential slide areas. The *building official* may deny a permit if the *building official* determines that the risks cannot be reduced to an acceptable level, that the proposed project or *construction documents* do not conform to the requirements of this code or other pertinent laws, ordinances or regulations, or to requirements included in the Master Use Permit or requirements otherwise imposed by the *building official* or other City departments, or that the applicant has failed to comply with any requirement or condition imposed pursuant to the authority described above.

106.6.7 Compliance with approved construction documents. When the *building official* issues a permit, the *building official* shall endorse the permit in writing or in electronic format, and stamp the plans APPROVED. Such *approved* plans and permit shall not be changed, modified or altered without authorization from the *building official*, and all work shall be done in accordance with the *approved construction documents* and permit except as authorized by the *building official* during a field inspection to correct errors or omissions or as authorized by Section 106.6.8.

106.6.8 Revisions to the permit. When changes to the *approved* work are made during construction, approval of the *building official* shall be obtained prior to execution. The building inspector may approve minor changes to the *construction documents* for work not reducing the structural strength or fire and life safety of the structure. The building inspector shall determine if it is necessary to revise the *approved construction documents*. No changes that are subject to special inspection required by Section 1704 shall be made during construction unless approved by the *building official*. If revised plans are required, changes shall be submitted to and approved by the *building official*, accompanied by fees specified in the *Fee Subtitle* prior to occupancy. All changes shall conform to the requirements of this code and other pertinent laws and ordinances and other issued permits.

106.6.9 Cancellation of permit applications. Applications may be cancelled if no permit is issued by the earlier of the following: (1) twelve months following the date of application; or (2) sixty days from the date of written notice that the permit is ready to issue. After cancellation, *construction documents* submitted for review may be returned to the applicant or destroyed by the *building official*.

The *building official* will notify the applicant in writing at least thirty days before the application is cancelled. The notice shall specify a date by which a request for extension must be submitted in order to avoid cancellation. The date shall be at least two weeks prior to the date on which the application will be cancelled.

106.6.10 Extensions prior to permit issuance. At the discretion of the *building official*, applications for projects that require more than 12 months to review and approve may be extended for a period that provides reasonable time to complete the review and approval, but in no case longer than 24 months from the date of the original application. No application may be extended more than once. After cancellation, the applicant shall submit a new application and pay a new fee to restart the permit process.

Notwithstanding other provisions of this code, applications may be extended where issuance of the permit is delayed by litigation, preparation of environmental impact statements, appeals, strikes or other causes related to the application that are beyond the applicant's control, or while the applicant is making progress toward issuance of a master use permit.

106.7 Retention of plans. One set of *approved* plans, which may be on microfilm or in electronic format, shall be retained by the *building official*. One set of *approved* plans shall be returned to the applicant and shall be kept at the site of the building or work for use by inspection personnel at all times during which the work authorized is in progress.

106.8 Validity of permit. The issuance or granting of a permit or approval of *construction documents* shall:

1. Not be construed to be a permit for, or an approval of, any violation of any of the provisions of this code or other pertinent laws and ordinances;
2. Not prevent the *building official* from requiring the correction of errors in the *construction documents* or from preventing building operations being carried on thereunder when in violation of this code or of other pertinent laws and ordinances of the City;
3. Not prevent the *building official* from requiring correction of conditions found to be in violation of this code or other pertinent laws and ordinances of the City; or
4. Not be construed to extend the period of time for which any such permit is issued or otherwise affect any period of time for compliance specified in any notice or order issued by the *building official* or other administrative authority requiring the correction of any such conditions.

106.9 Expiration of permits. Authority to do the work authorized by a permit expires 18 months from the date of issuance. An *approved* renewal extends the life of a permit for an additional 18 months from the prior expiration date. An *approved* reestablishment extends the life of the permit for 18 months from the date the permit expired.

Exceptions:

1. Initial permits for major construction projects that require more than 18 months to complete may be issued for a period that provides reasonable time to complete the work, according to an *approved* construction schedule. The *building official* may authorize a permit expiration date not to exceed three years from the date of issuance, except when there is an

associated Shoreline Substantial Development permit in which case the *building official* may authorize an expiration date not to exceed the life of the Shoreline permit.

2. The *building official* may issue permits which expire in less than eighteen months if the *building official* determines a shorter period is appropriate to complete the work.

This section is subject to the limitations in Seattle Municipal Code Section 22.800.100, Stormwater Code.

106.10 Renewal of permits. Permits may be renewed and renewed permits may be further renewed by the *building official* if the following conditions are met:

1. Application for renewal is made within the 30 day period immediately preceding the date of expiration of the permit; and
2. If the project has had an associated discretionary Land Use review, the land use approval has not expired; and
3. If an application for renewal is made more than 18 months after the date of mandatory compliance with a new or revised edition of the Seattle Building Code, the permit shall not be renewed unless:

   3.1 The *building official* determines that the permit complies, or is modified to comply, with the Seattle Building, Mechanical, Fuel Gas, Energy, Stormwater, Side Sewer and Grading codes in effect on the date of application for renewal; or

   3.2 The work authorized by the permit is substantially underway and progressing at a rate approved by the *building official*. "Substantially underway" means that normally required building inspections have been *approved* for work such as foundations, framing, mechanical, insulation and finish work that is being completed on a continuing basis; or

   3.3. Commencement or completion of the work authorized by the permit is delayed by litigation, appeals, strikes or other extraordinary circumstances related to the work authorized by the permit, beyond the permit holder's control, subject to approval by the *building official*; and

4. If an application for renewal is made on or after January 1, 2017, the permit shall not be renewed unless: (a) the *building official* determines that the permit complies, or is modified to comply, with the Seattle Stormwater Code in effect on the date of application for renewal; or (b) construction has started. For purposes of this provision, "started construction" means the site work associated with and directly related to the *approved* project has begun. For example, grading the project site to final grade or utility installation constitutes the start of construction; simply clearing the project site does not.

106.11 Reestablishment of expired permits. A new permit is required to complete work if a permit has expired and was not renewed.

Exception: A permit that expired less than one year prior to the date of a request for reestablishment may be reestablished upon approval of the *building official* if it complies with Section 106.10, Items 2, 3, and 4 above. Once re-established the permit will not be considered to have expired. The new expiration date of a reestablished permit shall be determined in accordance with Section 106.9.

106.12 Revocation of building permits. Whenever the *building official* determines there are grounds for revoking a permit, the *building official* may issue a notice of revocation. The notice of revocation shall identify the reason for the proposed revocation, including but not limited to, the violations, the conditions violated, and any alleged false or misleading information provided.

106.12.1 Standards for revocation. The *building official* may revoke a permit if:

1. The code or the building permit has been or is being violated and issuance of a notice of violation or stop work order has been or would be ineffective to secure compliance because of circumstances related to the violation; or
2. The permit was obtained with false or misleading information.

106.12.2 Service of notice of revocation. The notice of revocation shall be served upon the owner, agent or other responsible *person* by personal service or regular first class mail addressed to the last known address of such *person* or if no address is available after reasonable inquiry, the notice may be posted in a conspicuous place on the premises. The notice may also be posted if served by personal service or first class mail.

106.12.3 Effective date of revocation. The *building official* shall identify in the notice of revocation a date certain on which the revocation will take effect. This date may be stayed pending complete review by the *building official* pursuant to Section 106.12.4.

106.12.4 Review by the building official for notice of revocation. Any *person* aggrieved by a notice of revocation may obtain a review by making a request in writing to the *building official* within three business days of the date of service of the notice of revocation. The review shall occur within five business days after receipt by the *building official* of the request for review. Any *person* affected by the notice of revocation may submit additional information to the *building official* for consideration as part of the review at any time prior to the review.

106.12.4.1 Review procedure. The review will be made by a representative of the *building official* who will review all additional information received and may also request a site visit. After the review, the *building official* may:

1. Sustain the notice of revocation and affirm or modify the date the revocation will take effect;

2. Withdraw the notice of revocation;
3. Modify the notice of revocation and affirm or modify the date the revocation will take effect; or
4. Continue the review to a date certain.

106.12.4.2 Order of revocation of permit. The *building official* shall issue an order containing the decision within ten days after the review is completed and shall cause the same to be sent by regular first class mail to the *person* or *persons* requesting the review, any other *person* on whom the notice of revocation was served and any other *person* who requested a copy before issuance of the order. The order of the *building official* is the final order of the City, and the City and all parties shall be bound by the order.

106.13 Permits for temporary structures.

106.13.1 Tents and similar facilities used for 18 months or less. The *building official* may issue a permit to erect and maintain a tent or other similar temporary structure to be used for religious services, conventions, circuses, carnivals, fairs, special sales or similar uses for a period not to exceed eighteen months.

Exceptions:

1. Authority to issue permits is vested with the Fire Department for temporary tents and *canopies* meeting all of the following conditions:
   1.1. The permit is for less than four weeks;
   1.2. The temporary structure will be located 200 feet or more from shorelines;
   1.3. No stage, platform, bleacher or similar structure greater than 4 feet in height will be installed inside any temporary structure;
   1.4. No temporary structure will be attached to a building or other permanent structure for support;
   1.5. The temporary structure is not proposed to be used during severe weather, and
   1.6 The temporary structure is not of unusual shape, unusual location or large area or height.

Note: The Land Use and Fire codes may impose additional restrictions or conditions on tents and temporary structures.

106.13.1.1 Renewal. Permits issued pursuant to Section 106.13.1 are not renewable.

106.13.1.2 Subsequent permits. If the occupant load of the structure is 100 or more and is issued for less than 4 weeks, no more than one permit per tent vendor for each event shall be issued in any three-month period.

106.13.1.3 Removal. Such structures shall be removed before the expiration of the permit.

106.13.1.4 Requirements for tents and similar structures. The structure shall be subject to such reasonable safeguards for *persons* and property as the *building official* prescribes. The nature and extent of fire-extinguishing equipment and decorations shall be subject to the requirements of the fire chief, and the sanitary facilities shall meet the requirements of the Director of Public Health.

106.13.1.5 Cash deposit or bond. The *building official* may require that removal of the structure be guaranteed by a cash deposit with the *building official* or by a surety bond, the amount of which, in either case, shall be fixed by the *building official*. The cash deposit or bond shall also be conditioned so that, if the occupant or owner fails to conform to any of the requirements of the City related to the erection, maintenance or removal of the tent or other structure, the *building official* may enter the premises and take steps necessary to make the structure conform to the requirements. The City shall be permitted to recover the cost thereof from the cash deposit or bond.

106.13.2 Temporary structures. Temporary structures such as reviewing stands and other structures conforming to the requirements of this code, and sheds, *canopies*, or fences used for the protection of the public around and in conjunction with construction work may be erected by special permit from the *building official* for a limited period of time. The building or structure shall be subject to the bonding, removal and safety provisions of Section 106.13.1.5.

106.13.3 Temporary structures in the right-of-way. Temporary buildings or structures in the right-of-way are regulated by the Director of Transportation.

106.13.4 Temporary commercial coaches and modular homes. The *building official* may issue permits for eighteen months for the installation of commercial coaches and modular homes as temporary offices or other uses as may be determined by the *building official*, subject to the following:

1. Commercial coach shall be identified by a State of Washington black sticker located by the door. The structure may be placed on a temporary foundation and shall be anchored to resist wind and seismic lateral forces.

2. Modular homes shall be identified by a State of Washington gold sticker located by the door. Modular homes shall be permitted only if no heavy storage is anticipated for the temporary office use. The structure may be placed on a temporary foundation and shall be anchored to resist wind and seismic lateral forces.
3. A plot plan shall be submitted to verify compliance with the *Land Use Code* and to check exposure to other buildings.
4. The proposed use must be permitted outright under the *Land Use Code* and comply with all other pertinent laws and ordinances.
5. Construction offices, dry shacks and similar temporary buildings are regulated by Section 106.13.5.

106.13.4.1 Renewal of temporary commercial coach and modular home permits. A subsequent permit for another 18 months may be issued at the end of each 18 month period if the *building official* determines that the commercial coach or modular home complies with this section.

106.13.5 Construction buildings. The *building official* may issue a permit to erect and maintain construction offices, dry shacks and similar temporary buildings, including material and equipment storage, for the purpose of constructing an improvement.

Exception: A temporary permit is not required for construction offices and similar temporary buildings located on the same premises for which a construction permit has been issued.

106.13.5.1 Removal of construction buildings. Such structures shall be removed within 14 days after the end of the temporary permit's term. Removal shall be guaranteed by a cash deposit with the *building official* or by a surety bond, the amount of which, in either case, shall be fixed by the *building official*.

106.13.5.2 Requirements for construction buildings. The construction of the structure shall be subject to reasonable safeguards for *persons* and property as the *building official* shall prescribe; the nature and extent of fire-extinguishing equipment shall be subject to the requirements of the fire chief, and the sanitary facilities shall meet the requirements of the Director of Public Health.

106.13.5.3 Cash deposit or bond. The *building official* may require that removal of the structure be guaranteed by a cash deposit with the *building official* or by a surety bond, the amount of which, in either case, shall be fixed by the *building official*. The cash deposit or bond shall be conditioned so that, if the occupant or owner fails to conform to any of the requirements of the City related to the erection, maintenance or removal of the tent or other structure, the *building official* may enter the premises and take steps necessary to make the structure conform to the requirements. The City shall be permitted to recover the cost thereof from the cash deposit or bond.

SECTION 107
FLOOR AND ROOF DESIGN LOADS

107.1 Live loads posted. Where the live loads for which each floor or portion thereof of a commercial or industrial building is or has been designed to exceed 125 pounds per square foot and for all warehouse and storage areas, such design live loads shall be conspicuously posted by the owner or the owner's authorized agent in that part of each *story* in which they apply, using durable signs. It shall be unlawful to remove or deface such notices.

107.2 Issuance of certificate of occupancy. A certificate of occupancy required by Section 109 shall not be issued until the floor load signs, required by Section 107.1, have been installed.

107.3 Restrictions on loading. It shall be unlawful to place, or cause or permit to be placed, on any floor or roof of a building, structure or portion thereof, a load greater than is permitted by this code.

SECTION 108
INSPECTIONS

108.1 General. All construction or work for which a permit is required is subject to inspection by the *building official*, and certain types of construction shall have special inspections by registered special inspectors as specified in Chapter 17.

108.2 Surveys. A survey of the lot may be required by the *building official* to verify compliance of the structure with *approved construction documents.*

108.3 Preconstruction conferences. When required by the *building official*, the owner or the owner's agent shall arrange a conference with the project contractor, the design team, the special inspection agency if special inspection is required, and the *building official* prior to commencing work on any portion of construction. The intent of the conference is to identify and clarify unusual inspection requirements of the project. See Section 1703.7 for preconstruction conferences for projects requiring special inspection.

108.4 Inspection requests. The owner of the property or the owner's authorized agent, or the *person* designated by the owner or agent to do the work authorized by a permit shall notify the *building official* that work requiring inspection as specified in this section and Chapter 17 is ready for inspection.

108.5 Access for inspection. The permit holder and the *person* requesting any inspections required by this code shall provide access to and means for proper inspection of such work, including safety equipment required by Washington Industrial Safety and Health Agency. The work shall remain accessible and exposed for inspection purposes until approved by the *building official*. Neither the *building official* nor the City shall be liable for expense entailed in the required removal or replacement of any material to allow inspection.

108.6 Inspection record. Work requiring a permit shall not be commenced until the permit holder or the permit holder's agent has posted an inspection record in a conspicuous place on the premises and in a position that allows the *building official* to conveniently make the required entries regarding inspection of the work. This record shall be maintained in such a position by the permit holder or the permit holder's agent until final approval has been granted by the *building official*.

108.7 Approvals required. No work shall be done on any part of the building or structure beyond the point indicated in each successive inspection without first obtaining the written approval of the *building official*. Written approval shall be given only after an inspection has been made of each successive step in the construction as indicated by each of the inspections required in Section 108.9. There shall be a final inspection and approval of all buildings when completed and ready for occupancy.

108.7.1 Effect of approval. Approval as a result of an inspection is not an approval of any violation of the provisions of this code or of other pertinent laws and ordinances of the City. Inspections presuming to give authority to violate or cancel the provisions of this code or of other pertinent laws and ordinances of the City are not valid.

108.8 Concealment of work. No required reinforcing steel or structural framework of any part of any building or structure shall be covered or concealed in any manner whatsoever without first obtaining the approval of the *building official*. Protection of joints and penetrations in fire-resistance-rated assemblies, smoke barriers and smoke partitions shall not be concealed from view until inspected and *approved*.

Exception: Modular homes and commercial coaches identified by State of Washington stickers as specified in Section 106.13.4 and placed upon a permanent foundation approved and inspected by the *building official*.

108.9 Required inspections. The *building official*, upon notification by the permit holder or the permit holder's agent, of the property address and permit number, shall make the following inspections and shall either approve that portion of the construction as completed or shall notify the permit holder or the permit holder's agent if the construction fails to comply with the law.

108.9.1 First ground disturbance inspection. To be made prior to beginning *land-disturbing activity*, and following installation of erosion control measures and any required fencing that may restrict land disturbance in steep slope or other buffers as defined in Seattle Municipal Code Chapter 25.09.

Note: The purpose of the site inspection is to verify the erosion control method, location and proper installation. *Approved* drainage plan requirements and site plan conditions will also be verified, including buffer delineations.

108.9.2 Foundation inspection. To be made after trenches are excavated and forms erected and when all materials for the foundation are delivered on the job. Where concrete from a central mixing plant (commonly termed "ready mix") is to be used, materials need not be on the job.

108.9.3 Concrete slab or under-floor inspection. To be made after all in-slab or under-floor building service equipment, conduit, piping accessories and other ancillary equipment items are in place but before any concrete is poured or floor sheathing installed, including the subfloor.

108.9.4 Lowest floor elevation. In flood hazard areas, upon placement of the lowest floor, including the basement, and prior to further vertical construction, the elevation certification required in Section 1612.5 shall be submitted to the *building official*.

108.9.5 Frame inspection. To be made after the roof, all framing, fire-blocking and bracing are in place and all pipes, chimneys and vents are complete and the rough electrical, plumbing, and heating wires, pipes and ducts are *approved*.

108.9.6 Type IV-A, IV-B, and IV-C connection protection inspection. In buildings of Type IV-A, IV-B, and IV-C construction, where connection fire resistance ratings are provided by wood cover calculated to meet the requirements of Section 2304.10.1, inspection of the wood cover shall be made after the cover is installed, but before any other coverings or finishes are installed.

108.9.7 Insulation inspection. To be made after all insulation and vapor barriers are in place but before any gypsum board or plaster is applied.

108.9.8 Lath and/or gypsum board inspection. For shear walls, to be made after lathing and/or gypsum board, interior and exterior, is in place, but before any plastering is applied or before gypsum board joints and fasteners are taped and finished.

108.9.9 Final site inspection. To be made after all grading is complete, and all permanent erosion controls, stormwater facilities and stormwater best management practices have been installed.

Exception: A final site inspection is not required for projects with less than 750 square feet of *land disturbing activity*.

108.9.10 Final inspection. To be made after finish grading and the building is completed and before occupancy.

108.9.10.1 Flood hazard documentation. If located in a flood hazard area, documentation of the elevation of the lowest floor as required in Section 1612.5 shall be submitted to the *building official* prior to the final inspection.

108.10 Special inspections. For special inspections, see Chapter 17.

108.11 Other inspections. In addition to the called inspections specified above, the *building official* may make or require any other inspections of any construction work or site work to ascertain compliance with the provisions of this code and other pertinent laws and ordinances that are enforced by the *building official*.

108.12 Special investigation. If work that requires a permit or approval is commenced or performed prior to making formal application and receiving the *building official*'s permission to proceed, the *building official* may make a special investigation inspection before a permit is issued for the work. Where a special investigation is made, a special investigation fee may be assessed in accordance with the *Fee Subtitle*.

108.13 Reinspections. The *building official* may require a reinspection if work for which inspection is called is not complete, required corrections are not made, the inspection record is not properly posted on the work site, the *approved* plans are not readily available to the inspector, access is not provided on the date for which inspection is requested, or if deviations from *construction documents* that require the approval of the *building official* have been made without proper approval, or as otherwise required by the *building official*.

108.13.1 Compliance with International Existing Building Code Section 101.5. For the purpose of determining compliance with International Existing Building Code Section 101.5, Maintenance, the *building official* or the fire chief may cause any structure to be reinspected.

108.13.2 Reinspection fee. The *building official* may assess a reinspection fee as set forth in the *Fee Subtitle* for any action for which reinspection is required. In instances where reinspection fees have been assessed, no additional inspection of the work will be performed until the required fees have been paid.

SECTION 109
CERTIFICATE OF OCCUPANCY

109.1 Occupancy. No new building or structure shall be used or occupied until the *building official* has issued a Certificate of Occupancy. For *existing buildings*, a Certificate of Occupancy is required for:

1. Any *change of occupancy*,
2. Change in type of construction,
3. Addition, removal or change in type of a fire sprinkler system,
4. Changes in occupant load of an assembly occupancy,
5. Change in the number of *dwelling* units.

Exception: Certificates of occupancy are not required for:

1. Detached Group R-3 occupancies and Group U occupancies accessory to them, provided they shall not be used or occupied until *approved* for occupancy after final inspection.
2. Work exempt from permits under Section 106.2.
3. Work for which a temporary permit was issued under Section 106.13.

109.1.1 Effect of Certificate of Occupancy. Issuance of a Certificate of Occupancy is not approval of any violation of the provisions of this code or other pertinent laws and ordinances of the City. Certificates presuming to give authority to violate or cancel the provisions of this code or of other pertinent laws and ordinances of the City are not valid.

109.2 Change in occupancy. Changes in the occupancy of a building shall not be made except as specified in the International Existing Building Code.

109.3 Certificate issued. After satisfactory completion of inspections, if the *building official* finds that the building or structure requiring a Certificate of Occupancy complies with the provisions of this code, the Fire Code, other pertinent laws, ordinances and regulations of the City, and with all conditions imposed under any of them, and that the applicant has complied with all requirements to be performed prior to issuance of a Certificate of Occupancy in other pertinent laws, ordinances or regulations or in a Master Use Permit, or otherwise imposed by the *building official* or by another City department under any pertinent laws, ordinances or regulations, then the *building official* shall issue a Certificate of Occupancy which shall contain the following information:

1. The building permit number;
2. The address of the building;
3. A description of that portion of the building for which the certificate is issued;
4. A statement that the described portion of the building has been inspected for compliance with the requirements of this; and
5. The name of the *building official*.

109.4 Temporary certificate. A Temporary Certificate of Occupancy may be issued by the *building official* for the use of a portion or portions of a building or structure prior to the completion of the entire building or structure if all devices and safeguards for fire protection and life safety, as required by this code, the Fire Code, and other pertinent laws and ordinances of the City, are maintained in a safe and usable condition.

109.5 Posting. A Certificate of Occupancy shall be posted in a conspicuous place on the premises and shall not be removed except by the *building official*.

109.6 Suspension or revocation of Certificates of Occupancy.

109.6.1 Notice of suspension or revocation. Whenever the *building official* determines there are grounds for suspending or revoking a Certificate of Occupancy, the *building official* may issue a notice of revocation. The notice shall state the reason for suspension or revocation, and shall set the date that the suspension or revocation will take effect if compliance is not achieved by the date set in the notice, which shall be a reasonable time for compliance.

109.6.2 Standards for suspension or revocation of Certificates of Occupancy. The *building official* may suspend or revoke a Certificate of Occupancy if:

1. The certificate is issued in error or on the basis of incorrect information supplied; or
2. It is determined that the building or structure or portion thereof is in violation of any pertinent laws or ordinances of the City or any of the provisions of this code; or
3. When the building, site, applicant, or owner is in violation of any requirement or condition imposed by or pursuant to any other pertinent laws or ordinances of the City that provide for suspension or revocation of a Certificate of Occupancy.

109.6.3 Service of notice of suspension or revocation. The notice of suspension or revocation shall be served upon the owner, agent or other responsible *person* by personal service or regular first class mail addressed to the last known address of such *person* or if no address is available after reasonable inquiry, the notice may be posted in a conspicuous place on the premises. The notice may also be posted if served by personal service or first class mail.

109.6.4 Effect of notice of suspension or revocation. The notice shall be considered an order of the *building official* if no request for review before the *building official* is made pursuant to Section 109.6.5. Nothing in this subsection shall be deemed to limit or preclude any action or proceeding pursuant to Sections 102 or 103 of this code.

109.6.5 Review of suspension or revocation of Certificate of Occupancy by the building official. Any *person* affected by a notice of revocation issued pursuant to Section 109.6 may obtain a review of the notice by making a request in writing within ten days after service of the notice. When the last day of the period computed is a Saturday, Sunday, or city holiday, the period shall run until 5 p.m. of the next business day.

109.6.5.1 Review procedure. The review shall occur not less than ten nor more than 20 days after the request is received by the *building official* unless otherwise agreed by the *person* requesting the review. Any *person* affected by the notice of revocation may submit additional information to the *building official*. The review shall be made by a representative of the *building official* who will review any additional information that is submitted and the basis for issuance of the notice of suspension or revocation. The reviewer may request clarification of the information received and a site visit.

109.6.5.2 Decision. After the review, the *building official* shall:

1. Sustain the notice;
2. Withdraw the notice;
3. Amend the notice; or
4. Continue the review to a date certain

109.6.5.3 Order. The *building official* shall issue an order containing the decision within 15 days of the date that the review is completed and shall cause the order to be mailed by regular first class mail to the *persons* requesting the review and the *persons* named on the notice of violation addressed to their last known address.

SECTION 110
FEES

110.1 Fees. A fee for each building permit and for other activities related to the enforcement of this code shall be paid as set forth in the *Fee Subtitle*.

CHAPTER 2

DEFINITIONS

User notes:

About this chapter: *Codes, by their very nature, are technical documents. Every word, term and punctuation mark can add to or change the meaning of a technical requirement. It is necessary to maintain a consensus on the specific meaning of each term contained in the code. Chapter 2 performs this function by stating clearly what specific terms mean for the purpose of the code.*

Code development reminder: *Code change proposals to sections preceded by the designation [A] or [BS] will be considered by one of the code development committees meeting during the 2019 (Group B) Code Development Cycle. See explanation on page iv.*

SECTION 201
GENERAL

201.1 Scope. Unless otherwise expressly stated, the following words and terms shall, for the purposes of this code, have the meanings shown in this chapter.

201.2 Interchangeability. Words used in the present tense include the future; words stated in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

201.3 Terms defined in other codes. Where terms are not defined in this code and are defined in the *International Energy Conservation Code*, *International Fuel Gas Code*, *International Fire Code*, *International Mechanical Code* or ((~~*International*~~)) *Uniform Plumbing Code*, such terms shall have the meanings ascribed to them as in those codes.

201.4 Terms not defined. Where terms are not defined through the methods authorized by this section, such terms shall have ordinarily accepted meanings such as the context implies.

201.5 References to other codes. Whenever an International, National or Uniform Code is referenced in this code, it shall mean the Seattle edition of that code, including any local amendments. References to the "Building Code," "Fire Code," "Mechanical Code" and "Plumbing Code" mean the Seattle editions of those codes.

SECTION 202
DEFINITIONS

[BG] 24-HOUR BASIS. The actual time that a person is an occupant within a facility for the purpose of receiving care. It shall not include a facility that is open for 24 hours and is capable of providing care to someone visiting the facility during any segment of the 24 hours.

[BS] AAC MASONRY. *Masonry* made of autoclaved aerated concrete (AAC) units, manufactured without internal reinforcement and bonded together using thin- or thick-bed *mortar*.

[BE] ACCESSIBLE. A *site*, *building*, *facility* or portion thereof that complies with Chapter 11.

[BE] ACCESSIBLE MEANS OF EGRESS. A continuous and unobstructed way of egress travel from any *accessible* point in a *building* or *facility* to a *public way*.

[BE] ACCESSIBLE ROUTE. A continuous, unobstructed path that complies with Chapter 11.

[BE] ACCESSIBLE UNIT. A *dwelling unit* or *sleeping unit* that complies with this code and the provisions for Accessible units in ICC A117.1.

[BS] ACCREDITATION BODY. An *approved*, third-party organization that is independent of the grading and inspection agencies, and the lumber mills, and that initially accredits and subsequently monitors, on a continuing basis, the competency and performance of a grading or inspection agency related to carrying out specific tasks.

[A] ADDITION. An extension or increase in floor area, number of stories or height of a building or structure.

[BS] ADHERED MASONRY VENEER. *Veneer* secured and supported through the adhesion of an *approved* bonding material applied to an *approved backing*.

[BS] ADOBE CONSTRUCTION. Construction in which the exterior *load-bearing* and *nonload-bearing walls* and partitions are of unfired clay *masonry units*, and floors, roofs and interior framing are wholly or partly of wood or other *approved* materials.

Adobe, stabilized. Unfired clay *masonry units* to which admixtures, such as emulsified asphalt, are added during the manufacturing process to limit the units' water absorption so as to increase their durability.

Adobe, unstabilized. Unfired clay *masonry units* that do not meet the definition of "Adobe, stabilized."

[W] ADULT FAMILY HOME. A *dwelling*, licensed by the State of Washington Department of Social and Health Services, in which a person or persons provide personal care, special care, room and board to more than one but not more than six adults who are not related by blood or marriage to the person or persons providing the services. An existing adult family home may provide services to up to eight adults upon approval from the Department of Social and Health Services in accordance with RCW 70.128.066.

[F] AEROSOL CONTAINER. A metal can or plastic container up to a maximum size of 33.8 fluid ounces (1000 ml), or a glass bottle up to a maximum size of 4 fluid ounces (118 ml), designed and intended to dispense an aerosol.

[F] AEROSOL PRODUCT. A combination of a container, a propellant and a material that is dispensed. Aerosol products shall be classified by means of the calculation of their chemical heats of combustion and shall be designated Level 1, Level 2 or Level 3.

Level 1 aerosol products. Those with a total chemical heat of combustion that is less than or equal to 8,600 British thermal units per pound (Btu/lb) (20 kJ/g).

Level 2 aerosol products. Those with a total chemical heat of combustion that is greater than 8,600 Btu/lb (20 kJ/g), but less than or equal to 13,000 Btu/lb (30 kJ/g).

Level 3 aerosol products. Those with a total chemical heat of combustion that is greater than 13,000 Btu/lb (30 kJ/g).

[BS] AGGREGATE. In roofing, crushed stone, crushed slag or water-worn gravel used for surfacing for *roof coverings.*

[BG] AGRICULTURAL BUILDING. A structure designed and constructed to house farm implements, hay, grain, poultry, livestock or other horticultural products. This structure shall not be a place of human habitation or a place of employment where agricultural products are processed, treated or packaged, nor shall it be a place used by the public.

[BF] AIR-IMPERMEABLE INSULATION. An insulation having an air permeance equal to or less than 0.02 l/s × m^2 at 75 pa pressure differential tested in accordance with ASTM E2178 or ASTM E283.

[BG] AIR-INFLATED STRUCTURE. A structure that uses air-pressurized membrane beams, arches or other elements to enclose space. Occupants of such a structure do not occupy the pressurized area used to support the structure.

[BG] AIR-SUPPORTED STRUCTURE. A structure wherein the shape of the structure is attained by air pressure and occupants of the structure are within the elevated pressure area. Air-supported structures are of two basic types:

Double skin. Similar to a single skin, but with an attached liner that is separated from the outer skin and provides an airspace which serves for insulation, acoustic, aesthetic or similar purposes.

Single skin. Where there is only the single outer skin and the air pressure is directly against that skin.

[BE] AISLE. An unenclosed *exit access* component that defines and provides a path of egress travel.

[BE] AISLE ACCESSWAY. That portion of an *exit access* that leads to an *aisle*.

[F] ALARM NOTIFICATION APPLIANCE. A *fire alarm system* component such as a bell, horn, speaker, light or text display that provides audible, tactile or visible outputs, or any combination thereof.

[F] ALARM SIGNAL. A signal indicating an emergency requiring immediate action, such as a signal indicative of fire.

[F] ALARM VERIFICATION FEATURE. A feature of *automatic* fire detection and alarm systems to reduce unwanted alarms wherein *smoke detectors* report alarm conditions for a minimum period of time, or confirm alarm conditions within a given time period, after being *automatically* reset, in order to be accepted as a valid alarm-initiation signal.

[BS] ALLOWABLE STRESS DESIGN. A method of proportioning structural members, such that elastically computed stresses produced in the members by *nominal loads* do not exceed *specified* allowable stresses (also called "working stress design").

[A] ALTERATION. Any construction or renovation to an *existing structure* other than *repair* or *addition*.

[BE] ALTERNATING TREAD DEVICE. A device that has a series of steps between 50 and 70 degrees (0.87 and 1.22 rad) from horizontal, usually attached to a center support rail in an alternating manner so that the user does not have both feet on the same level at the same time.

[BG] AMBULATORY CARE FACILITY. Buildings or portions thereof used to provide medical, surgical, psychiatric, nursing or similar care on a less than 24-hour basis to persons who are rendered *incapable of self-preservation* by the services provided or staff has accepted responsibility for care recipients already incapable.

[BG] ANCHOR BUILDING. An exterior perimeter building of a group other than H having direct access to a *covered or open mall building* but having required *means of egress* independent of the mall.

[BS] ANCHORED MASONRY VENEER. *Veneer* secured with *approved* mechanical fasteners to an *approved backing*.

[BF] ANNULAR SPACE. The opening around the penetrating item.

[F] ANNUNCIATOR. A unit containing one or more indicator lamps, alphanumeric displays or other equivalent means in which each indication provides status information about a circuit, condition or location.

[A] APPROVED. Acceptable to the *building official*.

[A] APPROVED AGENCY. An established and recognized agency that is regularly engaged in conducting tests, furnishing inspection services or furnishing product certification where such agency has been *approved* by the *building official*.

[BS] APPROVED FABRICATOR. An established and qualified person, firm or corporation *approved* by the *building official* pursuant to Chapter 17 of this code.

[A] APPROVED SOURCE. An independent person, firm or corporation, *approved* by the *building official*, who is competent and experienced in the application of engineering principles to materials, methods or systems analyses.

[BS] AREA (for masonry).

Gross cross-sectional. The *area* delineated by the out-to-out *specified* dimensions of *masonry* in the plane under consideration.

Net cross-sectional. The *area* of *masonry units*, grout and *mortar* crossed by the plane under consideration based on out-to-out *specified* dimensions.

[BG] AREA, BUILDING. The area included within surrounding *exterior walls*, or *exterior walls* and *fire walls*, exclusive of vent *shafts* and *courts*. Areas of the building not provided with surrounding walls shall be included in the building area if such areas are included within the horizontal projection of the roof or floor above.

[BE] AREA OF REFUGE. An area where persons unable to use *stairways* can remain temporarily to await instructions or assistance during emergency evacuation.

[BE] AREA OF SPORT ACTIVITY. That portion of an indoor or outdoor space where the play or practice of a sport occurs.

[BG] AREAWAY. A subsurface space adjacent to a building open at the top or protected at the top by a grating or *guard*.

ASSEMBLY SEATING, MULTILEVEL. See "Multilevel assembly seating."

[W] ASSISTED LIVING FACILITY. A home or other institution, licensed by the state of Washington, providing housing, basic services and assuming general responsibility for the safety and well-being of residents under chapters 18.20 RCW and 388-78A WAC. These facilities may provide care to residents with symptoms consistent with dementia requiring additional security measures.

[BG] ATRIUM. An opening connecting two or more *stories* other than enclosed *stairways*, elevators, hoistways, escalators, plumbing, electrical, air-conditioning or other equipment, which is closed at the top and not defined as a mall. *Stories*, as used in this definition, do not include balconies within assembly groups or *mezzanines* that comply with Section 505.

[BG] ATTIC. The space between the ceiling framing of the top story and the underside of the roof.

[F] AUDIBLE ALARM NOTIFICATION APPLIANCE. A notification appliance that alerts by the sense of hearing.

[F] AUTOMATIC. As applied to fire protection devices, a device or system providing an emergency function without the necessity for human intervention and activated as a result of a predetermined temperature rise, rate of temperature rise or combustion products.

[F] AUTOMATIC FIRE-EXTINGUISHING SYSTEM. An *approved* system of devices and equipment which *automatically* detects a fire and discharges an *approved* fire-extinguishing agent onto or in the area of a fire.

[F] AUTOMATIC SMOKE DETECTION SYSTEM. A *fire alarm system* that has initiation devices that utilize *smoke detectors* for protection of an area such as a room or space with detectors to provide early warning of fire.

[F] AUTOMATIC SPRINKLER SYSTEM. An *automatic sprinkler system*, for fire protection purposes, is an integrated system of underground and overhead piping designed in accordance with fire protection engineering standards. The system includes a suitable water supply. The portion of the system above the ground is a network of specially sized or hydraulically designed piping installed in a structure or area, generally overhead, and to which *automatic* sprinklers are connected in a systematic pattern. The system is usually activated by heat from a fire and discharges water over the fire area.

[F] AUTOMATIC WATER MIST SYSTEM. A system consisting of a water supply, a pressure source and a distribution piping system with attached nozzles, which, at or above a minimum operating pressure defined by its listing, discharges water in fine droplets meeting the requirements of NFPA 750 for the purpose of the control, suppression or extinguishment of a fire. Such systems include wet-pipe, dry-pipe and preaction types. The systems are designed as engineered, preengineered, local-application or total-flooding systems.

[F] AVERAGE AMBIENT SOUND LEVEL. The root mean square, A-weighted sound pressure level measured over a 24-hour period, or the time any person is present, whichever time period is less.

[BG] AWNING. ((~~An architectural projection that provides weather protection, identity or decoration and is partially or wholly supported by the building to which it is attached. An awning is comprised of a lightweight *frame structure* over which a covering is attached.~~)) A protective covering with a nonrigid surface projecting from a building.

AWNING SIGN. A sign applied to the surface of an *awning* or *canopy*.

[BF] BACKING. The wall or surface to which the *veneer* is secured.

[BE] BALANCED DOOR. A door equipped with double-pivoted hardware so designed as to cause a semicounterbalanced swing action when opening.

[F] BALED COTTON. A natural seed fiber wrapped in and secured with industry accepted materials, usually consisting of burlap, woven polypropylene, polyethylene or cotton or sheet polyethylene, and secured with steel, synthetic or wire bands or wire; also includes linters (lint removed from the cottonseed) and motes (residual materials from the ginning process).

[F] BALED COTTON, DENSELY PACKED. Cotton made into banded bales with a packing density of not less than 22 pounds per cubic foot (360 kg/m^3), and dimensions complying with the following: a length of 55 inches (1397 mm), a width of 21 inches (533.4 mm) and a height of 27.6 to 35.4 inches (701 to 899 mm).

[BS] BALLAST. In roofing, ballast comes in the form of large stones or paver systems or light-weight interlocking paver systems and is used to provide uplift resistance for roofing systems that are not adhered or mechanically attached to the *roof deck*.

[F] BARRICADE. A structure that consists of a combination of walls, floor and roof, which is designed to withstand the rapid release of energy in an *explosion* and which is fully confined, partially vented or fully vented; or other effective method of shielding from explosive materials by a natural or artificial barrier.

Artificial barricade. An artificial mound or revetment a minimum thickness of 3 feet (914 mm).

Natural barricade. Natural features of the ground, such as hills, or timber of sufficient density that the surrounding exposures that require protection cannot be seen from the magazine or building containing explosives when the trees are bare of leaves.

[BS] BASE FLOOD. The *flood* having a 1-percent chance of being equaled or exceeded in any given year.

[BS] BASE FLOOD ELEVATION. The elevation of the *base flood*, including wave height, relative to the National Geodetic Vertical Datum (NGVD), North American Vertical Datum (NAVD) or other datum specified on the *Flood Insurance Rate Map* (FIRM).

[BS] BASEMENT (for flood loads). The portion of a building having its floor subgrade (below ground level) on all sides. This definition of "Basement" is limited in application to the provisions of Section 1612.

[BG] BASEMENT. A *story* that is not a *story above grade plane* (see "*Story above grade plane*"). This definition of "Basement" does not apply to the provisions of Section 1612 for flood *loads*.

[BS] BEARING WALL STRUCTURE. A building or other structure in which vertical *loads* from floors and roofs are primarily supported by walls.

[BS] BED JOINT. The horizontal layer of *mortar* on which a *masonry unit* is laid.

[BE] BLEACHERS. Tiered seating supported on a dedicated structural system and two or more rows high and is not a building element (see "*Grandstand*").

[BG] BOARDING HOUSE. A building arranged or used for lodging for compensation, with or without meals, and not occupied as a single-family unit.

[F] BOILING POINT. The temperature at which the vapor pressure of a *liquid* equals the atmospheric pressure of 14.7 pounds per square inch (psia) (101 kPa) or 760 mm of mercury. Where an accurate boiling point is unavailable for the material in question, or for mixtures which do not have a constant boiling point, for the purposes of this classification, the 20-percent evaporated point of a distillation performed in accordance with ASTM D86 shall be used as the boiling point of the *liquid*.

[W] BOTTLE FILLING STATION. A plumbing fixture connected to the potable water distribution system and sanitary drainage system that is designed and intended for filling personal use drinking water bottles or containers not less than 10 inches (254 mm) in height. Such fixtures can be separate from or integral to a drinking fountain and can incorporate a water filter and a cooling system for chilling the drinking water.

[BS] BRACED WALL LINE. A straight line through the building plan that represents the location of the lateral resistance provided by the wall bracing.

[BS] BRACED WALL PANEL. A full-height section of wall constructed to resist in-plane shear loads through interaction of framing members, sheathing material and anchors. The panel's length meets the requirements of its particular bracing method and contributes toward the total amount of bracing required along its *braced wall line*.

[BE] BREAKOUT. For revolving doors, a process whereby wings or door panels can be pushed open manually for *means of egress* travel.

[BS] BRICK.

Calcium silicate (sand lime brick). A pressed and subsequently autoclaved unit that consists of sand and lime, with or without the inclusion of other materials.

Clay or shale. A solid or hollow *masonry unit* of clay or shale, usually formed into a rectangular *prism*, then burned or fired in a kiln; brick is a ceramic product.

Concrete. A concrete *masonry unit* made from Portland cement, water, and suitable aggregates, with or without the inclusion of other materials.

[A] BUILDING. Any structure utilized or intended for supporting or sheltering any occupancy.

BUILDING AREA. See "Area, building."

[BG] BUILDING ELEMENT. A fundamental component of building construction, listed in Table 601, which may or may not be of fire-resistance-rated construction and is constructed of materials based on the building type of construction.

BUILDING HEIGHT. See "Height, building."

[BS] BUILDING-INTEGRATED PHOTOVOLTAIC (BIPV) PRODUCT. A building product that incorporates photovoltaic modules and functions as a component of the building envelope.

[BS] BUILDING-INTEGRATED PHOTOVOLTAIC ROOF PANEL (BIPV ROOF PANEL). A photovoltaic panel that functions as a component of the building envelope.

[BG] BUILDING LINE. The line established by law, beyond which a building shall not extend, except as specifically provided by law.

[A] BUILDING OFFICIAL. The ((~~officer or other designated authority charged with the administration and enforcement of this code~~)) Director of the Seattle Department of Construction and Inspections, or a duly authorized representative.

[BS] BUILT-UP ROOF COVERING. Two or more layers of felt cemented together and surfaced with a cap sheet, mineral *aggregate*, smooth coating or similar surfacing material.

[BG] CABLE-RESTRAINED, AIR-SUPPORTED STRUCTURE. A structure in which the uplift is resisted by cables or webbings which are anchored to either foundations or dead men. Reinforcing cable or webbing is attached by various methods to the membrane or is an integral part of the membrane. This is not a cable-supported structure.

[BG] CANOPY. ((~~A permanent structure or architectural projection of rigid construction over which a covering is attached that provides weather protection, identity or decoration. A canopy is permitted to be structurally independent or supported by attachment to a building on one or more sides.~~)) A protective covering with a rigid surface projecting from a building. *Marquees* are a type of *canopy*.

CANOPY SIGN. A sign applied to the surface of a *canopy*.

[F] CAPACITOR ENERGY STORAGE SYSTEM. A stationary, rechargeable energy storage system consisting of capacitors, chargers, controls and associated electrical equipment designed to provide electrical power to a building or facility. The system is typically used to provide standby or emergency power, an uninterruptable power supply, load shedding, load sharing or similar capabilities.

Preengineered capacitor energy storage system. A capacitor energy storage system consisting of capacitors, an energy management system, components and modules that are produced in a factory, designed to constitute the system when assembled and shipped to the job site for assembly.

Prepackaged capacitor energy storage system. A capacitor energy storage system consisting of capacitors, an energy management system, components and modules that is factory assembled and then shipped as a complete unit for installation at the job site.

[F] CARBON DIOXIDE EXTINGUISHING SYSTEMS. A system supplying carbon dioxide (CO_2) from a pressurized vessel through fixed pipes and nozzles. The system includes a manual- or *automatic*-actuating mechanism.

[F] CARBON MONOXIDE ALARM. A single- or multiple-station alarm intended to detect carbon monoxide gas and alert occupants by a distinct audible signal. It incorporates a sensor, control components and an alarm notification appliance in a single unit.

[F] CARBON MONOXIDE DETECTOR. A device with an integral sensor to detect carbon monoxide gas and transmit an alarm signal to a connected alarm control unit.

[BG] CARE SUITE. In Group I-2 occupancies, a group of treatment rooms, care recipient sleeping rooms and the support rooms or spaces and circulation space within the suite where staff are in attendance for supervision of all care recipients within the suite, and the suite is in compliance with the requirements of Section 407.4.4.

[BS] CAST STONE. A building stone manufactured from Portland cement concrete precast and used as a *trim*, *veneer* or facing on or in buildings or structures.

[F] CEILING LIMIT. The maximum concentration of an airborne contaminant to which one may be exposed. The ceiling limits utilized are those published in DOL 29 CFR Part 1910.1000. The ceiling Recommended Exposure Limit (REL-C) concentra-

tions published by the U.S. National Institute for Occupational Safety and Health (NIOSH), Threshold Limit Value—Ceiling (TLV-C) concentrations published by the American Conference of Governmental Industrial Hygienists (ACGIH), Ceiling Workplace Environmental Exposure Level (WEEL-Ceiling) Guides published by the American Industrial Hygiene Association (AIHA), and other *approved*, consistent measures are allowed as surrogates for hazardous substances not listed in DOL 29 CFR Part 1910.1000.

[BF] CEILING RADIATION DAMPER. A *listed* device installed in a ceiling membrane of a fire-resistance-rated floor/ceiling or roof/ceiling assembly to limit *automatically* the radiative heat transfer through an air inlet/outlet opening. Ceiling radiation dampers include air terminal units, ceiling dampers and ceiling air diffusers.

[BG] CELL (Group I-3 occupancy). A room within a housing unit in a detention or correctional facility used to confine inmates or prisoners.

[BS] CELL (masonry). A void space having a gross cross-sectional *area* greater than 1-1/2 square inches (967 mm^2).

[BG] CELL TIER. Levels of *cells* vertically stacked above one another within a *housing unit*.

[BS] CEMENT PLASTER. A mixture of Portland or blended cement, Portland cement or blended cement and hydrated lime, masonry cement or plastic cement and aggregate and other *approved* materials as specified in this code.

[BF] CERAMIC FIBER BLANKET. A high-temperature *mineral wool* insulation material made of alumina-silica ceramic or calcium magnesium silicate soluble fibers and weighing 4 to 10 pounds per cubic foot (pcf) (64 to 160 kg/m^3).

[BS] CERTIFICATE OF COMPLIANCE. A certificate stating that materials and products meet specified standards or that work was done in compliance with *approved construction documents*.

[A] CHANGE OF OCCUPANCY. A change in the use of a building or a portion a building which results in one of the following:

1. A change of occupancy classification.
2. A change from one group to another group within an occupancy classification.
3. Any change in use within a group for ((~~which there is a change in application of the requirements of this code~~)) a specific occupancy classification.

[W] CHILD CARE. The care of children during any period of a 24-hour day.

[W] CHILD CARE, FAMILY HOME. A *child care* facility, licensed by the state of Washington, located in the *dwelling* of the person or persons under whose direct care and supervision the child is placed, for the care of 12 or fewer children, including children who reside at the home.

[BG] CHILDREN'S PLAY STRUCTURE. A structure composed of one or more components, where the user enters a play environment.

[M] CHIMNEY. A primarily vertical structure containing one or more flues, for the purpose of carrying gaseous products of combustion and air from a fuel-burning appliance to the outdoor atmosphere.

Factory-built chimney. A *listed* and *labeled chimney* composed of factory-made components, assembled in the field in accordance with manufacturer's instructions and the conditions of the listing.

Masonry chimney. A field-constructed *chimney* composed of solid masonry units, bricks, stones, or concrete.

Metal chimney. A field-constructed *chimney* of metal.

[M] CHIMNEY TYPES.

High-heat appliance type. An *approved* chimney for removing the products of combustion from fuel-burning, high-heat appliances producing combustion gases in excess of 2000°F (1093°C) measured at the appliance flue outlet (see Section 2113.11.3).

Low-heat appliance type. An *approved* chimney for removing the products of combustion from fuel-burning, low-heat appliances producing combustion gases not in excess of 1000°F (538°C) under normal operating conditions, but capable of producing combustion gases of 1400°F (760°C) during intermittent forces firing for periods up to 1 hour. Temperatures shall be measured at the appliance flue outlet.

Masonry type. A field-constructed chimney of solid *masonry units* or stones.

Medium-heat appliance type. An *approved* chimney for removing the products of combustion from fuel-burning, medium-heat appliances producing combustion gases not exceeding 2000°F (1093°C) measured at the appliance flue outlet (see Section 2113.11.2).

[BE] CIRCULATION PATH. An exterior or interior way of passage from one place to another for pedestrians.

[F] CLEAN AGENT. Electrically nonconducting, volatile or gaseous fire extinguishant that does not leave a residue upon vaporation.

[BF] CLIMATE ZONE. A geographical region that has been assigned climatic criteria as specified in Chapters 3CE and 3RE of the *International Energy Conservation Code*.

[BG] CLINIC, OUTPATIENT. Buildings or portions thereof used to provide *medical care* on less than a 24-hour basis to persons who are not rendered *incapable of self-preservation* by the services provided.

[W] CLOSED CIRCUIT TELEPHONE. A telephone with a dedicated line such as a house phone, courtesy phone or phone that must be used to gain entrance to a facility.

[F] CLOSED SYSTEM. The *use* of a *solid* or *liquid hazardous material* involving a closed vessel or system that remains closed during normal operations where vapors emitted by the product are not liberated outside of the vessel or system and the product is not exposed to the atmosphere during normal operations; and all *uses* of *compressed gases*. Examples of closed systems for *solids* and *liquids* include product conveyed through a piping system into a closed vessel, system or piece of equipment.

[BS] COASTAL A ZONE. Area within a *special flood hazard area*, landward of a V zone or landward of an open coast without mapped *coastal high-hazard areas*. In a coastal A zone, the principal source of flooding must be astronomical tides, storm surges, seiches or tsunamis, not riverine flooding. During the base flood conditions, the potential for breaking wave height shall be greater than or equal to 1-1/2 feet (457 mm). The inland limit of the coastal A zone is (a) the Limit of Moderate Wave Action if delineated on a FIRM, or (b) designated by the authority having jurisdiction.

[BS] COASTAL HIGH-HAZARD AREA. Area within the *special flood hazard area* extending from offshore to the inland limit of a primary dune along an open coast and any other area that is subject to high-velocity wave action from storms or seismic sources, and shown on a Flood Insurance Rate Map (FIRM) or other flood hazard map as velocity Zone V, VO, VE or V1-30.

[BS] COLLAR JOINT. Vertical longitudinal space between *wythes* of *masonry* or between *masonry wythe* and backup construction that is permitted to be filled with *mortar* or grout.

[BS] COLLECTOR. A horizontal *diaphragm* element parallel and in line with the applied force that collects and transfers *diaphragm* shear forces to the vertical elements of the lateral force-resisting system or distributes forces within the *diaphragm*, or both.

[BF] COMBINATION FIRE/SMOKE DAMPER. A *listed* device installed in ducts and air transfer openings designed to close *automatically* upon the detection of heat and resist the passage of flame and smoke. The device is installed to operate *automatically*, controlled by a smoke detection system, and where required, is capable of being positioned from a *fire command center*.

[BS] COMBINED PILE RAFT. A geotechnical composite construction that combines the bearing effect of both foundation elements, raft and piles, by taking into account interactions between the foundation elements and the subsoil.

[F] COMBUSTIBLE DUST. Finely divided *solid* material that is 420 microns or less in diameter and which, when dispersed in air in the proper proportions, could be ignited by a flame, spark or other source of ignition. Combustible dust will pass through a U.S. No. 40 standard sieve.

[F] COMBUSTIBLE FIBERS. Readily ignitable and free-burning materials in a fibrous or shredded form, such as cocoa fiber, cloth, cotton, excelsior, hay, hemp, henequen, istle, jute, kapok, oakum, rags, sisal, Spanish moss, straw, tow, wastepaper, certain synthetic fibers or other like materials. This definition does not include densely packed baled cotton.

[F] COMBUSTIBLE LIQUID. A *liquid* having a closed cup *flash point* at or above 100°F (38°C). Combustible liquids shall be subdivided as follows:

Class II. *Liquids* having a closed cup *flash point* at or above 100°F (38°C) and below 140°F (60°C).

Class IIIA. *Liquids* having a closed cup *flash point* at or above 140°F (60°C) and below 200°F (93°C).

Class IIIB. *Liquids* having a closed cup *flash point* at or above 200°F (93°C).

The category of combustible liquids does not include *compressed gases* or *cryogenic fluids*.

[F] COMMERCIAL MOTOR VEHICLE. A motor vehicle used to transport passengers or property where the motor vehicle meets one of the following:

1. Has a gross vehicle weight rating of 10,000 pounds (4540 kg) or more.
2. Is designed to transport 16 or more passengers, including the driver.

[BE] COMMON PATH OF EGRESS TRAVEL. That portion of *exit access* travel distance measured from the most remote point of each room, area or space to that point where the occupants have separate and distinct access to two *exits* or *exit access* doorways.

[BE] COMMON USE. Interior or exterior *circulation paths*, rooms, spaces or elements that are not for public use and are made available for the shared use of two or more people.

[F] COMPRESSED GAS. A material or mixture of materials that meets both of the following:

1. Is a gas at 68°F (20°C) or less at 14.7 pounds per square inch atmosphere (psia) (101 kPa) of pressure.
2. Has a *boiling point* of 68°F (20°C) or less at 14.7 psia (101 kPa) which is either liquefied, nonliquefied or in solution, except those gases which have no other health- or physical-hazard properties are not considered to be compressed until the pressure in the packaging exceeds 41 psia (282 kPa) at 68°F (20°C).

The states of a compressed gas are categorized as follows:

1. Nonliquefied compressed gases are gases, other than those in solution, which are in a packaging under the charged pressure and are entirely gaseous at a temperature of 68°F (20°C).
2. Liquefied compressed gases are gases that, in a packaging under the charged pressure, are partially *liquid* at a temperature of 68°F (20°C).
3. Compressed gases in solution are nonliquefied gases that are dissolved in a solvent.
4. Compressed gas mixtures consist of a mixture of two or more compressed gases contained in a packaging, the hazard properties of which are represented by the properties of the mixture as a whole.

[BS] CONCRETE.

Carbonate aggregate. Concrete made with aggregates consisting mainly of calcium or magnesium carbonate, such as limestone or dolomite, and containing 40 percent or less quartz, chert or flint.

Cellular. A lightweight insulating concrete made by mixing a preformed foam with Portland cement slurry and having a dry unit weight of approximately 30 pcf (480 kg/m^3).

Lightweight aggregate. Concrete made with aggregates of expanded clay, shale, slag or slate or sintered fly ash or any natural lightweight aggregate meeting ASTM C330 and possessing equivalent fire-resistance properties and weighing 85 to 115 pcf (1360 to 1840 kg/m^3).

Perlite. A lightweight insulating concrete having a dry unit weight of approximately 30 pcf (480 kg/m^3) made with perlite concrete aggregate. Perlite aggregate is produced from a volcanic rock which, when heated, expands to form a glass-like material of cellular structure.

Sand-lightweight. Concrete made with a combination of expanded clay, shale, slag, slate, sintered fly ash, or any natural lightweight aggregate meeting ASTM C330 and possessing equivalent fire-resistance properties and natural sand. Its unit weight is generally between 105 and 120 pcf (1680 and 1920 kg/m^3).

Siliceous aggregate. Concrete made with normal-weight aggregates consisting mainly of silica or compounds other than calcium or magnesium carbonate, which contains more than 40-percent quartz, chert or flint.

Vermiculite. A light weight insulating concrete made with vermiculite concrete aggregate which is laminated micaceous material produced by expanding the ore at high temperatures. When added to a Portland cement slurry the resulting concrete has a dry unit weight of approximately 30 pcf (480 kg/m^3).

[BG] CONGREGATE LIVING FACILITIES. A building or part thereof that contains *sleeping units* where residents share bathroom or kitchen facilities, or both.

[F] CONSTANTLY ATTENDED LOCATION. A designated location at a facility staffed by trained personnel on a continuous basis where alarm or supervisory signals are monitored and facilities are provided for notification of the fire department or other emergency services.

[A] CONSTRUCTION DOCUMENTS. Written, graphic and pictorial documents, in electronic or paper format, prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building *permit* and final approval of construction.

[BG] CONSTRUCTION TYPES. See Section 602.

Type I. See Section 602.2.

Type II. See Section 602.2.

Type III. See Section 602.3.

Type IV. See Section 602.4.

Type V. See Section 602.5.

[BF] CONTINUOUS INSULATION (ci). Insulating material that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior, or is integral to any opaque surface of the building envelope.

[F] CONTROL AREA. Spaces within a building where quantities of *hazardous materials* not exceeding the maximum allowable quantities per control area are stored, dispensed, *used* or handled. See the definition of "Outdoor control area" in the *International Fire Code*.

[BS] CONTROLLED LOW-STRENGTH MATERIAL. A self-compacted, cementitious material used primarily as a backfill in place of compacted fill.

[BS] CONVENTIONAL LIGHT-FRAME CONSTRUCTION. Construction whose primary structural elements are formed by a system of repetitive wood-framing members. See Section 2308 for conventional light-frame construction provisions.

[BG] CORNICE. A projecting horizontal molded element located at or near the top of an architectural feature.

[BE] CORRIDOR. An enclosed *exit access* component that defines and provides a path of egress travel.

CORRIDOR, OPEN-ENDED. See "Open-ended corridor."

[BF] CORRIDOR DAMPER. A *listed* device intended for use where air ducts penetrate or terminate at horizontal openings in the ceilings of fire-resistance-rated corridors, where the corridor ceiling is permitted to be constructed as required for the corridor walls.

[BS] CORROSION RESISTANCE. The ability of a material to withstand deterioration of its surface or its properties when exposed to its environment.

[F] CORROSIVE. A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the point of contact. A chemical shall be considered corrosive if, when tested on the intact skin of albino rabbits by the method described in DOTn 49 CFR, Part 173.137, such chemical destroys or changes irreversibly the structure of the tissue at the point of contact following an exposure period of 4 hours. This term does not refer to action on inanimate surfaces.

[BG] COURT. An open, uncovered space, unobstructed to the sky, bounded on three or more sides by exterior building walls or other enclosing devices.

COVERED BOAT MOORAGE. A *pier* or system of floating or fixed accessways to which vessels on water may be secured, and any portion of which is covered by a roof.

[BG] COVERED MALL BUILDING. A single building enclosing a number of tenants and occupants, such as retail stores, drinking and dining establishments, entertainment and amusement facilities, passenger transportation terminals, offices and other similar uses wherein two or more tenants have a main entrance into one or more malls. *Anchor buildings* shall not be considered as a part of the covered mall building. The term "covered mall building" shall include *open mall buildings* as defined below.

Mall. A roofed or covered common pedestrian area within a *covered mall building* that serves as access for two or more tenants and not to exceed three levels that are open to each other. The term "mall" shall include open malls as defined below.

Open mall. An unroofed common pedestrian way serving a number of tenants not exceeding three levels. Circulation at levels above grade shall be permitted to include open exterior balconies leading to *exits* discharging at grade.

Open mall building. Several structures housing a number of tenants, such as retail stores, drinking and dining establishments, entertainment and amusement facilities, offices, and other similar uses, wherein two or more tenants have a main entrance into one or more open malls. *Anchor buildings* are not considered as a part of the open mall building.

[BS] CRIPPLE WALL. A framed stud wall extending from the top of the foundation to the underside of floor framing for the lowest occupied floor level.

[F] CRITICAL CIRCUIT. A circuit that requires continuous operation to ensure safety of the structure and occupants.

[BS] CROSS-LAMINATED TIMBER. A prefabricated engineered wood product consisting of not less than three layers of solid-sawn lumber or *structural composite lumber* where the adjacent layers are cross oriented and bonded with structural adhesive to form a solid wood element.

[F] CRYOGENIC FLUID. A *liquid* having a *boiling point* lower than -150°F (-101°C) at 14.7 pounds per square inch atmosphere (psia) (an absolute pressure of 101 kPa).

[BG] CUSTODIAL CARE. Assistance with day-to-day living tasks; such as assistance with cooking, taking medication, bathing, using toilet facilities and other tasks of daily living. Custodial care includes persons receiving care who have the ability to respond to emergency situations and evacuate at a slower rate and/or who have mental and psychiatric complications.

[BS] DALLE GLASS. A decorative composite glazing material made of individual pieces of glass that are embedded in a cast matrix of concrete or epoxy.

DAMPER. See "*Ceiling radiation damper*," "*Combination fire/smoke damper*," "*Corridor damper*," "*Fire damper*" and "*Smoke damper*."

((~~**[BS] DANGEROUS.** Any building, structure or portion thereof that meets any of the conditions described below shall be deemed dangerous:~~

1. ~~The building or structure has collapsed, has partially collapsed, has moved off its foundation or lacks the necessary support of the ground.~~
2. ~~There exists a significant risk of collapse, detachment or dislodgment of any portion, member, appurtenance or ornamentation of the building or structure under service loads.~~))

[F] DAY BOX. A portable magazine designed to hold explosive materials constructed in accordance with the requirements for a Type 3 magazine as defined and classified in Chapter 56 of the *International Fire Code*.

[BS] DEAD LOAD. The weight of materials of construction incorporated into the building, including but not limited to walls, floors, roofs, ceilings, *stairways*, built-in partitions, finishes, cladding and other similarly incorporated architectural and structural items, and the weight of fixed service equipment, such as cranes, plumbing stacks and risers, electrical feeders, heating, ventilating and air-conditioning systems and *automatic sprinkler systems*.

[BS] DECORATIVE GLASS. A carved, leaded or *Dalle glass* or glazing material whose purpose is decorative or artistic, not functional; whose coloring, texture or other design qualities or components cannot be removed without destroying the glazing material and whose surface, or assembly into which it is incorporated, is divided into segments.

[F] DECORATIVE MATERIALS. All materials applied over the building *interior finish* for decorative, acoustical or other effect including, but not limited to, curtains, draperies, fabrics and streamers; and all other materials utilized for decorative effect including, but not limited to, bulletin boards, artwork, posters, photographs, batting, cloth, cotton, hay, stalks, straw, vines, leaves, trees, moss and similar items, foam plastics and materials containing foam plastics. Decorative materials do not include wall coverings, ceiling coverings, floor coverings, ordinary window shades, *interior finish* and materials 0.025 inch (0.64 mm) or less in thickness applied directly to and adhering tightly to a substrate.

[BS] DEEP FOUNDATION. A deep foundation is a foundation element that does not satisfy the definition of a *shallow foundation.*

[BE] DEFEND-IN-PLACE. A method of emergency response that engages building components and trained staff to provide occupant safety during an emergency. Emergency response involves remaining in place, relocating within the building, or both, without evacuating the building.

[A] DEFERRED SUBMITTAL. Those portions of the design that are not submitted at the time of the application and that are to be submitted to the *building official* within a specified period. *Deferred submittals* include but are not limited to shop drawings for truss systems and sprinkler systems.

[F] DEFLAGRATION. An exothermic reaction, such as the extremely rapid oxidation of a flammable dust or vapor in air, in which the reaction progresses through the unburned material at a rate less than the velocity of sound. A deflagration can have an explosive effect.

[BF] DELAYED-ACTION CLOSER. A self-closing device that incorporates a delay prior to the initiation of closing. Delayed-action closers are mechanical devices with an adjustable delay.

[F] DELUGE SYSTEM. A sprinkler system employing open sprinklers attached to a piping system connected to a water supply through a valve that is opened by the operation of a detection system installed in the same areas as the sprinklers. When this valve opens, water flows into the piping system and discharges from all sprinklers attached thereto.

[BS] DESIGN DISPLACEMENT. See Section 1905.1.1.

[BS] DESIGN EARTHQUAKE GROUND MOTION. The earthquake ground motion that buildings and structures are specifically proportioned to resist in Section 1613.

[BS] DESIGN FLOOD. The *flood* associated with the greater of the following two areas:

1. Area with a flood plain subject to a 1-percent or greater chance of *flooding* in any year.
2. Area designated as a *flood hazard area* on a community's flood hazard map, or otherwise legally designated.

[BS] DESIGN FLOOD ELEVATION. The elevation of the "*design flood*," including wave height, relative to the datum specified on the community's legally designated flood hazard map. In areas designated as Zone AO, the *design flood elevation* shall be the elevation of the highest existing grade of the building's perimeter plus the depth number (in feet) specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number shall be taken as being equal to 2 feet (610 mm).

DESIGN PROFESSIONAL, REGISTERED. See "Registered design professional."

DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE, REGISTERED. See "Registered design professional in responsible charge."

[BS] DESIGN STRENGTH. The product of the nominal strength and a *resistance factor* (or strength reduction factor).

[BS] DESIGNATED SEISMIC SYSTEM. Those nonstructural components that require design in accordance with Chapter 13 of ASCE 7 and for which the component importance factor, I_p, is greater than 1 in accordance with Section 13.1.3 of ASCE 7.

[F] DETACHED BUILDING. A separate single-*story* building, without a basement or crawl space, used for the storage or *use* of *hazardous materials* and located an *approved* distance from all structures.

[BS] DETAILED PLAIN CONCRETE STRUCTURAL WALL. See Section 1905.1.1.

[BE] DETECTABLE WARNING. A standardized surface feature built in or applied to walking surfaces or other elements to warn visually impaired persons of hazards on a *circulation path.*

[F] DETECTOR, HEAT. A fire detector that senses heat— either abnormally high temperature or rate of rise, or both.

[F] DETONATION. An exothermic reaction characterized by the presence of a shock wave in the material which establishes and maintains the reaction. The reaction zone progresses through the material at a rate greater than the velocity of sound. The principal heating mechanism is one of shock compression. Detonations have an explosive effect.

[BG] DETOXIFICATION FACILITIES. Facilities that provide treatment for substance abuse, serving care recipients who are *incapable of self-preservation* or who are harmful to themselves or others.

[BS] DIAPHRAGM. A horizontal or sloped system acting to transmit lateral forces to vertical elements of the lateral force-resisting system. When the term "diaphragm" is used, it shall include horizontal bracing systems.

Diaphragm, blocked. In *light-frame construction*, a diaphragm in which all sheathing edges not occurring on a framing member are supported on and fastened to blocking.

Diaphragm boundary. In *light-frame construction*, a location where shear is transferred into or out of the diaphragm sheathing. Transfer is either to a boundary element or to another force-resisting element.

Diaphragm chord. A diaphragm boundary element perpendicular to the applied load that is assumed to take axial stresses due to the diaphragm moment.

Diaphragm, unblocked. A diaphragm that has edge nailing at supporting members only. Blocking between supporting structural members at panel edges is not included. Diaphragm panels are field nailed to supporting members.

[BS] DIMENSIONS (for Chapter 21).

Nominal. The *specified dimension* plus an allowance for the *joints* with which the units are to be laid. Nominal dimensions are usually stated in whole numbers. Thickness is given first, followed by height and then length.

Specified. Dimensions specified for the manufacture or construction of a unit, *joint* or element.

[BE] DIRECT ACCESS. A path of travel from a space to an immediately adjacent space through an opening in the common wall between the two spaces.

[F] DISPENSING. The pouring or transferring of any material from a container, tank or similar vessel, whereby vapors, dusts, fumes, mists or gases are liberated to the atmosphere.

DISPLAY SURFACE. The area of a *sign structure* used to display the message.

DOOR, BALANCED. See "Balanced door."

DOOR, LOW-ENERGY POWER-OPERATED. See "Low-energy power-operated door."

DOOR, POWER-ASSISTED. See "Power-assisted door."

DOOR, POWER-OPERATED. See "Power-operated door."

DOORWAY, EXIT ACCESS. See "Exit access doorway."

[BG] DORMITORY. A space in a building where group sleeping accommodations are provided in one room, or in a series of closely associated rooms, for persons not members of the same family group, under joint occupancy and single management, as in college dormitories or fraternity houses.

[BF] DRAFTSTOP. A material, device or construction installed to restrict the movement of air within open spaces of concealed areas of building components such as crawl spaces, floor/ceiling assemblies, roof/ceiling assemblies and *attics*.

DRAG STRUT. See "Collector."

[BS] DRILLED SHAFT. A cast-in-place deep foundation element, also referred to as a caisson, drilled pier or bored pile, constructed by drilling a hole (with or without permanent casing or drilling fluid) into soil or rock and filling it with fluid concrete after the drilling equipment is removed.

Socketed drilled shaft. A drilled shaft with a permanent pipe or tube casing that extends down to bedrock and an uncased socket drilled into the bedrock.

[F] DRY-CHEMICAL EXTINGUISHING AGENT. A powder composed of small particles, usually of sodium bicarbonate, potassium bicarbonate, urea-potassium-based bicarbonate, potassium chloride or monoammonium phosphate, with added particulate material supplemented by special treatment to provide resistance to packing, resistance to moisture absorption (caking) and the proper flow capabilities.

[BS] DRY FLOODPROOFING. A combination of design modifications that results in a building or structure, including the attendant utilities and equipment and sanitary facilities, being watertight with walls substantially impermeable to the passage of water and with structural components having the capacity to resist *loads* as identified in ASCE 7.

[A] DWELLING. A building that contains one or two *dwelling units* used, intended or designed to be used, rented, leased, let or hired out to be occupied for living purposes.

[A] DWELLING UNIT. A single unit providing complete, independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.

DWELLING UNIT OR SLEEPING UNIT, MULTISTORY. See "Multistory unit."

[W] EFFICIENCY DWELLING UNIT. A dwelling unit where all permanent provisions for living, sleeping, eating and cooking are contained in a single room.

[BE] EGRESS COURT. A *court* or *yard* which provides access to a *public way* for one or more *exits*.

ELECTRIC SIGN. Any sign containing electrical wiring, but not including signs illuminated by an exterior light source.

[BF] ELECTRICAL CIRCUIT PROTECTIVE SYSTEM. A specific construction of devices, materials, or coatings installed as a fire-resistive barrier system applied to electrical system components, such as cable trays, conduits and other raceways, open run cables and conductors, cables, and conductors.

[F] ELEVATOR GROUP. A grouping of elevators in a building located adjacent or directly across from one another that responds to common hall call buttons.

[F] EMERGENCY ALARM SYSTEM. A system to provide indication and warning of emergency situations involving *hazardous materials*.

[F] EMERGENCY CONTROL STATION. An *approved* location on the premises where signals from emergency equipment are received and which is staffed by trained personnel.

[BE] EMERGENCY ESCAPE AND RESCUE OPENING. An operable window, door or other similar device that provides for a means of escape and access for rescue in the event of an emergency.

((~~**[F] EMERGENCY POWER SYSTEM.** A source of automatic electric power of a required capacity and duration to operate required life-safety, fire alarm, detection and ventilation systems in the event of a failure of the primary power. Emergency power systems are required for electrical loads where interruption of the primary power could result in loss of human life or serious injuries.~~))

EMERGENCY POWER SYSTEM. An electrical system that complies with Seattle Electrical Code Article 700.

[F] EMERGENCY VOICE/ALARM COMMUNICATIONS. Dedicated manual or *automatic* facilities for originating and distributing voice instructions, as well as alert and evacuation signals pertaining to a fire emergency, to the occupants of a building.

[BE] EMPLOYEE WORK AREA. All or any portion of a space used only by employees and only for work. *Corridors*, toilet rooms, kitchenettes and break rooms are not employee work areas.

[BS] ENGINEERED WOOD RIM BOARD. A full-depth structural composite lumber, wood structural panel, structural glued laminated timber or prefabricated wood I-joist member designed to transfer horizontal (shear) and vertical (compression) loads, provide attachment for diaphragm sheathing, siding and exterior deck ledgers, and provide lateral support at the ends of floor or roof joists or rafters.

ENTRANCE, PUBLIC. See "Public entrance."

ENTRANCE, RESTRICTED. See "Restricted entrance."

ENTRANCE, SERVICE. See "Service entrance."

[BG] EQUIPMENT PLATFORM. An unoccupied, elevated platform used exclusively for mechanical systems or industrial process equipment, including the associated elevated walkways, stairways, alternating tread devices and ladders necessary to access the platform (see Section 505.3).

[BS] ESSENTIAL FACILITIES. Buildings and other structures that are intended to remain operational in the event of extreme environmental loading from *flood*, wind, snow or earthquakes.

[F] EXHAUSTED ENCLOSURE. An appliance or piece of equipment that consists of a top, a back and two sides providing a means of local exhaust for capturing gases, fumes, vapors and mists. Such enclosures include laboratory hoods, exhaust fume hoods and similar appliances and equipment used to locally retain and exhaust the gases, fumes, vapors and mists that could be released. Rooms or areas provided with general *ventilation*, in themselves, are not exhausted enclosures.

[A] EXISTING BUILDING (Except for Section 1612.2). A building erected prior to the date of adoption of the appropriate code, or one for which a ((~~legal building *permit*~~)) valid Certificate of Occupancy has been issued.

[BS] EXISTING STRUCTURE (Except for Section 1612.2). A structure erected prior to the date of adoption of the appropriate code, or one for which a ((~~legal building *permit*~~)) valid Certificate of Occupancy has been issued.

[BE] EXIT. That portion of a *means of egress* system between the *exit access* and the *exit discharge* or *public way*. Exit components include exterior exit doors at the *level of exit discharge*, *interior exit stairways* and *ramps*, *exit passageways*, *exterior exit stairways* and *ramps* and *horizontal exits*.

[BE] EXIT ACCESS. That portion of a *means of egress* system that leads from any occupied portion of a building or structure to an *exit*.

[BE] EXIT ACCESS DOORWAY. A door or access point along the path of egress travel from an occupied room, area or space where the path of egress enters an intervening room, *corridor*, *exit access stairway* or *ramp*.

[BE] EXIT ACCESS RAMP. A *ramp* within the exit access portion of the means of egress system.

[BE] EXIT ACCESS STAIRWAY. A *stairway* within the exit access portion of the means of egress system.

[BE] EXIT DISCHARGE. That portion of a *means of egress* system between the termination of an *exit* and a *public way*.

[BE] EXIT DISCHARGE, LEVEL OF. The *story* at the point at which an *exit* terminates and an *exit discharge* begins.

EXIT, HORIZONTAL. See "Horizontal exit."

[BE] EXIT PASSAGEWAY. An *exit* component that ((~~is separated from other interior spaces of a building or structure by fire-resistance-rated construction and opening protectives, and~~)) provides for a protected path of egress travel in a horizontal direction to an *exit* or to the *exit discharge*.

[BF] EXPANDED VINYL WALL COVERING. Wall covering consisting of a woven textile backing, an expanded vinyl base coat layer and a nonexpanded vinyl skin coat. The expanded base coat layer is a homogeneous vinyl layer that contains a blowing agent. During processing, the blowing agent decomposes, causing this layer to expand by forming closed cells. The total thickness of the wall covering is approximately 0.055 inch to 0.070 inch (1.4 mm to 1.78 mm).

[F] EXPLOSION. An effect produced by the sudden violent expansion of gases, which may be accompanied by a shock wave or disruption, or both, of enclosing materials or structures. An explosion could result from any of the following:

1. Chemical changes such as rapid oxidation, *deflagration* or *detonation*, decomposition of molecules and runaway polymerization (usually *detonation*s).
2. Physical changes such as pressure tank ruptures.
3. Atomic changes (nuclear fission or fusion).

[F] EXPLOSIVE. A chemical compound, mixture or device, the primary or common purpose of which is to function by explosion. The term includes, but is not limited to: dynamite, black powder, pellet powder, initiating explosives, detonators, safety fuses, squibs, detonating cord, igniter cord, and igniters.

The term "explosive" includes any material determined to be within the scope of USC Title 18: Chapter 40 and also includes any material classified as an explosive other than consumer fireworks, 1.4G by the *hazardous materials* regulations of DOTn 49 CFR Parts 100-185.

High explosive. Explosive material, such as dynamite, which can be caused to detonate by means of a No. 8 test blasting cap when unconfined.

Low explosive. Explosive material that will burn or deflagrate when ignited. It is characterized by a rate of reaction that is less than the speed of sound. Examples of low explosives include, but are not limited to: black powder; safety fuse; igniters; igniter cord; fuse lighters; fireworks; and propellants, 1.3C.

Mass-detonating explosives. Division 1.1, 1.2 and 1.5 explosives alone or in combination, or loaded into various types of ammunition or containers, most of which can be expected to explode virtually instantaneously when a small portion is subjected to fire, severe concussion, impact, the impulse of an initiating agent or the effect of a considerable discharge of energy from without. Materials that react in this manner represent a mass explosion hazard. Such an explosive will normally cause severe structural damage to adjacent objects. Explosive propagation could occur immediately to other items of ammunition and explosives stored sufficiently close to and not adequately protected from the initially exploding pile with a time interval short enough so that two or more quantities must be considered as one for quantity-distance purposes.

UN/DOTn Class 1 explosives. The former classification system used by DOTn included the terms "high" and "low" explosives as defined herein. The following terms further define explosives under the current system applied by DOTn for all explosive materials defined as hazard Class 1 materials. Compatibility group letters are used in concert with the division to specify further limitations on each division noted (i.e., the letter G identifies the material as a pyrotechnic substance or article containing a pyrotechnic substance and similar materials).

Division 1.1. Explosives that have a mass explosion hazard. A mass explosion is one which affects almost the entire load instantaneously.

Division 1.2. Explosives that have a projection hazard but not a mass explosion hazard.

Division 1.3. Explosives that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.

Division 1.4. Explosives that pose a minor explosion hazard. The explosive effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package.

Division 1.5. Very insensitive explosives. This division is comprised of substances that have a mass explosion hazard, but that are so insensitive there is very little probability of initiation or of transition from burning to *detonation* under normal conditions of transport.

Division 1.6. Extremely insensitive articles which do not have a mass explosion hazard. This division is comprised of articles that contain only extremely insensitive detonating substances and which demonstrate a negligible probability of accidental initiation or propagation.

[BE] EXTERIOR EXIT RAMP. An *exit* component that serves to meet one or more *means of egress* design requirements, such as required number of *exits* or *exit access* travel distance, and is open to *yards*, *courts* or *public ways*.

[BE] EXTERIOR EXIT STAIRWAY. An *exit* component that serves to meet one or more *means of egress* design requirements, such as required number of *exits* or *exit access* travel distance, and is open to *yards*, *courts* or *public ways*.

[BF] EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS). EIFS are nonstructural, nonload-bearing, *exterior wall* cladding systems that consist of an insulation board attached either adhesively or mechanically, or both, to the substrate; an integrally reinforced base coat and a textured protective finish coat.

[BF] EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS) WITH DRAINAGE. An EIFS that incorporates a means of drainage applied over a *water-resistive barrier*.

[BF] EXTERIOR SURFACES. Weather-exposed surfaces.

[BF] EXTERIOR WALL. A wall, bearing or nonbearing, that is used as an enclosing wall for a building, other than a *fire wall*, and that has a slope of 60 degrees (1.05 rad) or greater with the horizontal plane.

[BF] EXTERIOR WALL COVERING. A material or assembly of materials applied on the exterior side of *exterior walls* for the purpose of providing a weather-resisting barrier, insulation or for aesthetics, including but not limited to, *veneers*, siding, *exterior insulation and finish systems*, architectural *trim* and embellishments such as *cornices*, soffits, facias, gutters and leaders.

[BF] EXTERIOR WALL ENVELOPE. A system or assembly of *exterior wall* components, including *exterior wall* finish materials, that provides protection of the building structural members, including framing and sheathing materials, and conditioned interior space, from the detrimental effects of the exterior environment.

[BF] F RATING. The time period that the *through-penetration firestop system* limits the spread of fire through the penetration when tested in accordance with ASTM E814 or UL 1479.

[BF] FABRIC PARTITION. A partition consisting of a finished surface made of fabric, without a continuous rigid backing, that is directly attached to a framing system in which the vertical framing members are spaced greater than 4 feet (1219 mm) on center.

[BS] FABRICATED ITEM. Structural, load-bearing or lateral load-resisting members or assemblies consisting of materials assembled prior to installation in a building or structure, or subjected to operations such as heat treatment, thermal cutting, cold working or reforming after manufacture and prior to installation in a building or structure. Materials produced in accordance with standards referenced by this code, such as rolled structural steel shapes, steel reinforcing bars, *masonry units* and *wood structural panels*, or in accordance with a referenced standard that provides requirements for quality control done under the supervision of a third-party quality control agency, are not "fabricated items."

[F] FABRICATION AREA. An area within a semiconductor fabrication facility and related research and development areas in which there are processes using hazardous production materials. Such areas are allowed to include ancillary rooms or areas such as dressing rooms and offices that are directly related to the fabrication area processes.

[A] FACILITY. All or any portion of buildings, structures, *site* improvements, elements and pedestrian or vehicular routes located on a *site*.

[BS] FACTORED LOAD. The product of a *nominal load* and a *load factor*.

FEE SUBTITLE. Seattle Municipal Code Title 22, Subtitle IX.

[BS] FENESTRATION. Products classified as either vertical fenestration or skylights and sloped glazing, installed in such a manner as to preserve the weather-resistant barrier of the wall or roof in which they are installed. Fenestration includes products with glass or other transparent or translucent materials.

[BS] FENESTRATION, VERTICAL. Windows that are fixed or movable, opaque doors, glazed doors, glazed block and combination opaque and glazed doors installed in a wall at less than 15 degrees from the vertical.

[BS] FIBER-CEMENT (BACKER BOARD, SIDING, SOFFIT, TRIM AND UNDERLAYMENT) PRODUCTS. Manufactured thin section composites of hydraulic cementitious matrices and discrete nonasbestos fibers.

[BF] FIBER-REINFORCED POLYMER. A polymeric composite material consisting of reinforcement fibers, such as glass, impregnated with a fiber-binding polymer which is then molded and hardened. Fiber-reinforced polymers are permitted to contain cores laminated between fiber-reinforced polymer facings.

[BS] FIBERBOARD. A fibrous, homogeneous panel made from lignocellulosic fibers (usually wood or cane) and having a density of less than 31 pounds per cubic foot (pcf) (497 kg/m^3) but more than 10 pcf (160 kg/m^3).

FIELD NAILING. See "Nailing, field."

FIRE ALARM BOX, MANUAL. See "Manual fire alarm box."

[F] FIRE ALARM CONTROL UNIT. A system component that receives inputs from *automatic* and manual *fire alarm* devices and may be capable of supplying power to detection devices and transponders or off-premises transmitters. The control unit may be capable of providing a transfer of power to the notification appliances and transfer of condition to relays or devices.

[F] FIRE ALARM SIGNAL. A signal initiated by a *fire alarm-initiating device* such as a *manual fire alarm box, automatic fire detector*, waterflow switch or other device whose activation is indicative of the presence of a fire or fire signature.

[F] FIRE ALARM SYSTEM. A system or portion of a combination system consisting of components and circuits arranged to monitor and annunciate the status of *fire alarm* or *supervisory signal-initiating device*s and to initiate the appropriate response to those signals.

[BF] FIRE AREA. The aggregate floor area enclosed and bounded by *fire walls, fire barriers, exterior walls* or *horizontal assemblies* of a building. Areas of the building not provided with surrounding walls shall be included in the fire area if such areas are included within the horizontal projection of the roof or floor next above.

[BF] FIRE BARRIER. A fire-resistance-rated wall assembly of materials designed to restrict the spread of fire in which continuity is maintained.

FIRE CODE OFFICIAL. The chief of the Seattle Fire Department or a duly authorized representative.

[F] FIRE COMMAND CENTER. The principal attended or unattended location where the status of detection, alarm communications and control systems is displayed, and from which the systems can be manually controlled.

[BF] FIRE DAMPER. A *listed* device installed in ducts and air transfer openings designed to close *automatically* upon detection of heat and resist the passage of flame. Fire dampers are classified for use in either static systems that will *automatically* shut down in the event of a fire, or in dynamic systems that continue to operate during a fire. A dynamic fire damper is tested and rated for closure under elevated temperature airflow.

FIRE DETECTION SYSTEM. A system of smoke or heat detectors monitored at an *approved* central station, with no requirement for notification appliances in the building.

[F] FIRE DETECTOR, AUTOMATIC. A device designed to detect the presence of a fire signature and to initiate action.

FIRE DISTRICT. That part of the city within the boundary described as follows:

Beginning at the intersection of the center line of Alaskan Way and Clay Street; thence northeasterly along the center line of Clay Street to an intersection with the center line of Denny Way; thence easterly along the center line of Denny Way to an intersection with the center line of Yale Avenue; thence southeasterly along the center line of Yale Avenue to an intersection with the center line of Interstate Highway 5; thence southerly and southeasterly along the centerline of Interstate Highway 5 to an intersection with the center line of 7th Avenue South; thence southerly along the center line of 7th Avenue South to an intersection with the center line of Dearborn Street; thence westerly along the center line of Dearborn Street to an intersection with the center line of Airport Way; thence northwesterly along the center line of Airport Way to an intersection with the center line of 4th Avenue South; thence southerly along the center line of 4th Avenue South to an intersection with the center line of South Royal Brougham Way; thence westerly along the center line of South Royal Brougham Way to an intersection with the center line of South Alaskan Way; thence southerly along the center line of South Alaskan Way to an intersection with the center line of South Massachusetts Street, thence westerly along the center line of South Massachusetts Street to the Outer Harbor Line in Elliott Bay, thence northerly and northwesterly along the Outer Harbor Line to an intersection with the center line of West Harrison Street, thence easterly along the center line of West Harrison Street to an intersection with the center line of Alaskan Way, then southeasterly along the center line of Alaskan Way to the point of beginning.

Buildings and structures located partially within and partially outside the *Fire District* are considered to be located in the *Fire District*. See Figure 202F.

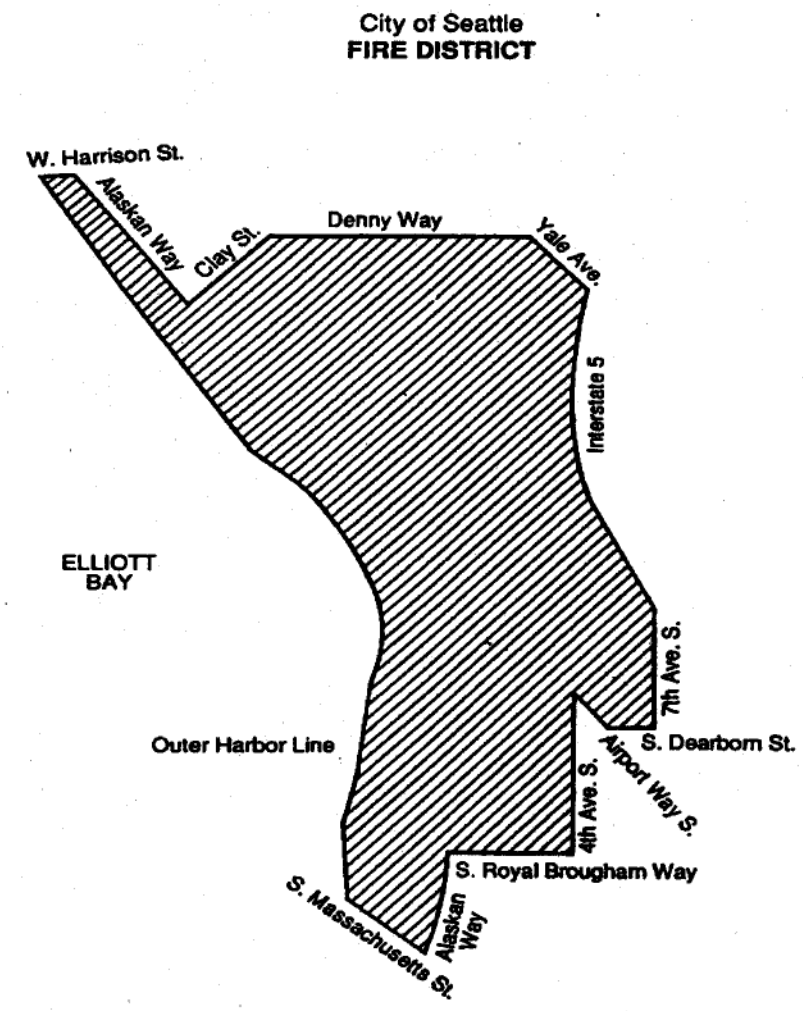


FIGURE 202F

[BF] FIRE DOOR. The door component of a *fire door assembly*.

[BF] FIRE DOOR ASSEMBLY. Any combination of a *fire door*, frame, hardware and other accessories that together provide a specific degree of fire protection to the opening.

FIRE DOOR ASSEMBLY, FLOOR. See "Floor fire door assembly."

[BF] FIRE EXIT HARDWARE. *Panic hardware* that is *listed* for use on *fire door assemblies*.

[F] FIRE LANE. A road or other passageway developed to allow the passage of fire apparatus. A fire lane is not necessarily intended for vehicular traffic other than fire apparatus.

[BF] FIRE PARTITION. A vertical assembly of materials designed to restrict the spread of fire in which openings are protected.

[BF] FIRE PROTECTION RATING. The period of time that an opening protective will maintain the ability to confine a fire as determined by tests specified in Section 716. Ratings are stated in hours or minutes.

[F] FIRE PROTECTION SYSTEM. *Approved* devices, equipment and systems or combinations of systems used to detect a fire, activate an alarm, extinguish or control a fire, control or manage smoke and products of a fire or any combination thereof.

[BF] FIRE-RATED GLAZING. Glazing with either a *fire protection rating* or a *fire-resistance rating*.

[BF] FIRE RESISTANCE. That property of materials or their assemblies that prevents or retards the passage of excessive heat, hot gases or flames under conditions of use.

[BF] FIRE-RESISTANCE RATING. The period of time a building element, component or assembly maintains the ability to confine a fire, continues to perform a given structural function, or both, as determined by the tests, or the methods based on tests, prescribed in Section 703.

[BF] FIRE-RESISTANT JOINT SYSTEM. An assemblage of specific materials or products that are designed, tested and fire-resistance rated in accordance with either ASTM E1966 or UL 2079 to resist for a prescribed period of time the passage of fire through *joints* made in or between fire-resistance-rated assemblies.

FIRE-RETARDANT COVERING. Material with a flame spread rating of less than 15 when tested in accordance with ASTM E84.

[F] FIRE SAFETY FUNCTIONS. Building and fire control functions that are intended to increase the level of life safety for occupants or to control the spread of harmful effects of fire.

[BF] FIRE SEPARATION DISTANCE. The distance measured from the building face to one of the following:

1. The closest interior *lot line*.
2. To the ((~~centerline~~)) opposite side of a street, an alley or *public way*.
3. To an imaginary line between two buildings on the lot.

The distance shall be measured at right angles from the face of the wall.

[BF] FIRE WALL. A fire-resistance-rated wall having protected openings, which restricts the spread of fire and extends continuously from the foundation to or through the roof. ((~~, with sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of the wall.~~))

[BF] FIRE WINDOW ASSEMBLY. A window constructed and glazed to give protection against the passage of fire.

[BF] FIREBLOCKING. Building materials, or materials *approved* for use as fireblocking, installed to resist the free passage of flame to other areas of the building through concealed spaces.

[M] FIREPLACE. A hearth and fire chamber or similar prepared place in which a fire may be made and which is built in conjunction with a chimney.

[BS] FIREPLACE THROAT. The opening between the top of the firebox and the smoke chamber.

FIRESTOP, MEMBRANE-PENETRATION. See "Membrane-penetration firestop."

FIRESTOP, PENETRATION. See "Penetration firestop."

FIRESTOP SYSTEM, THROUGH-PENETRATION. See "Through-penetration firestop system."

[F] FIREWORKS. Any composition or device for the purpose of producing a visible or audible effect for entertainment purposes by combustion, *deflagration* or *detonation* that meets the definition of 1.4G fireworks or 1.3G fireworks.

Fireworks, 1.3G. Large fireworks devices, which are explosive materials, intended for use in fireworks displays and designed to produce audible or visible effects by combustion, *deflagration* or *detonation*. Such 1.3G fireworks include, but are not limited to, firecrackers containing more than 130 milligrams (2 grains) of explosive composition, aerial shells containing more than 40 grams of pyrotechnic composition, and other display pieces which exceed the limits for classification as 1.4G fireworks. Such 1.3G fireworks are also described as fireworks, UN0335 by the DOTn.

Fireworks, 1.4G. Small fireworks devices containing restricted amounts of pyrotechnic composition designed primarily to produce visible or audible effects by combustion or deflagration that complies with the construction, chemical composition and labeling regulations of the DOTn for fireworks, UN0336, and the U.S. Consumer Product Safety Commission (CPSC) as set forth in CPSC 16 CFR: Parts 1500 and 1507.

[BG] FIXED BASE OPERATOR (FBO). A commercial business granted the right by the airport sponsor to operate on an airport and provide aeronautical services, such as fueling, hangaring, tie-down and parking, aircraft rental, aircraft maintenance and flight instruction.

[BE] FIXED SEATING. Furniture or fixture designed and installed for the use of sitting and secured in place including bench-type seats and seats with or without backs or armrests.

[BF] FLAME SPREAD. The propagation of flame over a surface.

[BF] FLAME SPREAD INDEX. A comparative measure, expressed as a dimensionless number, derived from visual measurements of the spread of flame versus time for a material tested in accordance with ASTM E84 or UL 723.

[F] FLAMMABLE GAS. A material that is a gas at 68°F (20°C) or less at 14.7 pounds per square inch atmosphere (psia) (101 kPa) of pressure [a material that has a *boiling point* of 68°F (20°C) or less at 14.7 psia (101 kPa)], which also meets one of the following:

1. Is ignitable at 14.7 psia (101 kPa) when in a mixture of 13 percent or less by volume with air.
2. Has a flammable range at 14.7 psia (101 kPa) with air of at least 12 percent, regardless of the lower limit.

The limits specified shall be determined at 14.7 psi (101 kPa) of pressure and a temperature of 68°F (20°C) in accordance with ASTM E681.

[BE] GRADE FLOOR OPENING. A window or other opening located such that the sill height of the opening is not more than 44 inches (1118 mm) above or below the finished ground level adjacent to the opening.

[BG] GRADE PLANE. A reference plane representing the average of finished ground level adjoining the building at *exterior walls*. Where the finished ground level slopes away from the *exterior walls*, the reference plane shall be established by the lowest points within the area between the building and the *lot line* or, where the *lot line* is more than 6 feet (1829 mm) from the building, between the building and a point 6 feet (1829 mm) from the building. For grade of structures built over water, see Section 425.3.

GRADE PLANE, STORY ABOVE. See "Story above grade plane."

[BE] GRANDSTAND. Tiered seating supported on a dedicated structural system and two or more rows high and is not a building element (see "*Bleachers*").

[BG] GREENHOUSE. A structure or thermally isolated area of a building that maintains a specialized sunlit environment used for and essential to the cultivation, protection or maintenance of plants.

[BG] GROSS LEASABLE AREA. The total floor area designed for tenant occupancy and exclusive use. The area of tenant occupancy is measured from the centerlines of joint partitions to the outside of the tenant walls. All tenant areas, including areas used for storage, shall be included in calculating gross leasable area.

[BG] GROUP HOME. A facility for social rehabilitation, substance abuse or mental health problems that contains a group housing arrangement that provides *custodial care* but does not provide medical care.

[BE] GUARD. A building component or a system of building components located at or near the open sides of elevated walking surfaces that minimizes the possibility of a fall from the walking surface to a lower level.

[BG] GUESTROOM. A room used or intended to be used by one or more guests for living or sleeping purposes.

[BS] GYPSUM BOARD. The generic name for a family of sheet products consisting of a noncombustible core primarily of gypsum with paper surfacing. Gypsum wallboard, gypsum sheathing, gypsum base for gypsum veneer plaster, exterior gypsum soffit board, predecorated gypsum board and water-resistant gypsum backing board complying with the standards listed in Tables 2506.2, 2507.2 and Chapter 35 are types of gypsum board.

[BS] GYPSUM PANEL PRODUCT. The general name for a family of sheet products consisting essentially of gypsum.

[BS] GYPSUM PLASTER. A mixture of calcined gypsum or calcined gypsum and lime and aggregate and other *approved* materials as specified in this code.

[BS] GYPSUM VENEER PLASTER. *Gypsum plaster* applied to an *approved* base in one or more coats normally not exceeding 1/4 inch (6.4 mm) in total thickness.

[BG] HABITABLE SPACE. A space in a building for living, sleeping, eating or cooking. Bathrooms, toilet rooms, closets, halls, storage or utility spaces and similar areas are not considered habitable spaces.

[F] HALOGENATED EXTINGUISHING SYSTEM. A fire-extinguishing system using one or more atoms of an element from the halogen chemical series: fluorine, chlorine, bromine and iodine.

[F] HANDLING. The deliberate transport by any means to a point of storage or *use*.

[BE] HANDRAIL. A horizontal or sloping rail intended for grasping by the hand for guidance or support.

[BS] HARDBOARD. A fibrous-felted, homogeneous panel made from lignocellulosic fibers consolidated under heat and pressure in a hot press to a density not less than 31 pcf (497 kg/m^3).

HARDWARE. See "Fire exit hardware" and "Panic hardware."

[F] HAZARDOUS MATERIALS. Those chemicals or substances that are *physical hazards* or *health hazards* as classified in Section 307 and the *International Fire Code*, whether the materials are in usable or waste condition.

[F] HAZARDOUS PRODUCTION MATERIAL (HPM). A *solid*, *liquid* or gas associated with semiconductor manufacturing that has a degree-of-hazard rating in health, flammability or instability of Class 3 or 4 as ranked by NFPA 704 and which is *used* directly in research, laboratory or production processes which have as their end product materials that are not hazardous.

[BS] HEAD JOINT. Vertical *mortar joint* placed between *masonry units* within the *wythe* at the time the *masonry units* are laid.

[F] HEALTH HAZARD. A classification of a chemical for which there is statistically significant evidence that acute or chronic health effects are capable of occurring in exposed persons. The term "health hazard" includes chemicals that are *toxic* or *highly toxic*, and *corrosive*.

HEAT DETECTOR. See "Detector, heat."

[BG] HEIGHT, BUILDING. The vertical distance from *grade plane* to the average height of the highest roof surface other than rooftop structures complying with Section 1510.

[BS] HELICAL PILE. Manufactured steel deep foundation element consisting of a central shaft and one or more helical bearing plates. A helical pile is installed by rotating it into the ground. Each helical bearing plate is formed into a screw thread with a uniform defined pitch.

[F] HELIPAD. A structural surface that is used for the landing, taking off, taxiing and parking of helicopters.

[F] HELIPORT. An area of land or water or a structural surface that is used, or intended for use, for the landing and taking off of helicopters, and any appurtenant areas that are used, or intended for use, for heliport buildings or other heliport facilities.

[F] HELISTOP. The same as "heliport," except that no fueling, defueling, maintenance, repairs or storage of helicopters is permitted.

[F] HIGHER EDUCATION LABORATORY. Laboratories in Group B occupancies used for educational purposes above the 12th grade. Storage, use and handling of chemicals in such laboratories shall be limited to purposes related to testing, analysis, teaching, research or developmental activities on a nonproduction basis.

[F] HIGHLY TOXIC. A material which produces a lethal dose or lethal concentration that falls within any of the following categories:

1. A chemical that has a median lethal dose (LD_{50}) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
2. A chemical that has a median lethal dose (LD_{50}) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.
3. A chemical that has a median lethal concentration (LC_{50}) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

Mixtures of these materials with ordinary materials, such as water, might not warrant classification as *highly toxic.* While this system is basically simple in application, any hazard evaluation that is required for the precise categorization of this type of material shall be performed by experienced, technically competent persons.

[BF] HIGH-PRESSURE DECORATIVE EXTERIOR-GRADE COMPACT LAMINATE (HPL). Panels consisting of layers of cellulose fibrous material impregnated with thermosetting resins and bonded together by a high-pressure process to form a homogeneous nonporous core suitable for exterior use.

[BF] HIGH-PRESSURE DECORATIVE EXTERIOR-GRADE COMPACT LAMINATE (HPL) SYSTEM. An *exterior wall covering* fabricated using HPL in a specific assembly including *joints*, seams, attachments, substrate, framing and other details as appropriate to a particular design.

[BG] HIGH-RISE BUILDING. A building with an occupied floor located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access.

[A] HISTORIC BUILDINGS. ((~~Any building or structure that is one or more of the following:~~)) See "LANDMARK".

((~~1. Listed or certified as eligible for listing by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, in the National Register of Historic Places.~~

~~2. Designated as historic under an applicable state or local law.~~

~~3. Certified as a contributing resource within a National Register, state designated or locally designated historic district.~~))

[BF] HORIZONTAL ASSEMBLY. A fire-resistance-rated floor or *roof assembly* of materials designed to restrict the spread of fire in which continuity is maintained.

[BE] HORIZONTAL EXIT. An *exit* component consisting of fire-resistance-rated construction and opening protectives intended to compartmentalize portions of a building thereby creating refuge areas that afford safety from the fire and smoke from the area of fire origin.

[W] HOSPICE CARE CENTER. A building or portion thereof used on a 24-hour basis for the provision of hospice services to terminally ill inpatients.

[BG] HOSPITALS AND PSYCHIATRIC HOSPITALS. Facilities that provide care or treatment for the medical, psychiatric, obstetrical, or surgical treatment of care recipients who are *incapable of self-preservation.*

[BG] HOUSING UNIT. A *dormitory* or a group of *cells* with a common dayroom in Group I-3.

HPM. See "Hazardous Production Material."

[F] HPM ROOM. A room used in conjunction with or serving a Group H-5 occupancy, where *HPM* is stored or *used* and which is classified as a Group H-2, H-3 or H-4 occupancy.

((~~**[A] JURISDICTION.** The governmental unit that has adopted this code.~~))

[BF] L RATING. The air leakage rating of a *through penetration firestop system* or a fire-resistant *joint* system when tested in accordance with UL 1479 or UL 2079, respectively.

[A] LABEL. An identification applied on a product by the manufacturer that contains the name of the manufacturer, the function and performance characteristics of the product or material and the name and identification of an *approved agency*, and that indicates that the representative sample of the product or material has been tested and evaluated by an *approved agency* (see Section 1703.5, "Manufacturer's designation" and "Mark").

[A] LABELED. Equipment, materials or products to which has been affixed a *label*, seal, symbol or other identifying *mark* of a nationally recognized testing laboratory, *approved* agency or other organization concerned with product evaluation that maintains periodic inspection of the production of the above-labeled items and whose labeling indicates either that the equipment, material or product meets identified standards or has been tested and found suitable for a specified purpose.

[F] LABORATORY SUITE. A fire-rated, enclosed laboratory area providing one or more laboratory spaces within a Group B educational occupancy that includes ancillary uses such as offices, bathrooms and corridors that are contiguous with the laboratory area, and are constructed in accordance with Section 428.

LAND USE CODE. *Seattle Land Use Code*, Title 23 of the Seattle Municipal Code, as amended.

LAND-DISTURBING ACTIVITY. Any activity that results in a movement of earth, or a change in the existing soil cover (both vegetative and nonvegetative) or the existing topography. Land-disturbing activities include, but are not limited to, clearing, grading, filling, excavation or addition or replacement of impervious surface.

LANDMARK. A building or structure that is subject to a requirement to obtain a certificate of approval from the City Landmarks Preservation Board before altering or making significant changes to specific features or characteristics, that has been nominated for designation and the City Landmarks Preservation Board has not issued a determination regarding designation, that has been designated for preservation by the City Landmarks Preservation Board, that has been designated for preservation by the State of Washington, that has been listed or determined eligible to be listed in the National Register of Historic Places, or that is located in a *landmark* or special review district subject to a requirement to obtain a certificate of approval before making a change to the external appearance of a structure.

LEVEL OF EXIT DISCHARGE. See "Exit discharge, level of."

[BF] LIGHT-DIFFUSING SYSTEM. Construction consisting in whole or in part of lenses, panels, grids or baffles made with light-transmitting plastics positioned below independently mounted electrical light sources, skylights or light-transmitting plastic roof panels. Lenses, panels, grids and baffles that are part of an electrical fixture shall not be considered as a light-diffusing system.

[BS] LIGHT-FRAME CONSTRUCTION. Construction whose vertical and horizontal structural elements are primarily formed by a system of repetitive wood or cold-formed steel framing members.

[BF] LIGHT-TRANSMITTING PLASTIC ROOF PANELS. Structural plastic panels other than skylights that are fastened to structural members, or panels or sheathing and that are used as light-transmitting media in the plane of the roof.

[BF] LIGHT-TRANSMITTING PLASTIC WALL PANELS. Plastic materials that are fastened to structural members, or to structural panels or sheathing, and that are used as light-transmitting media in *exterior walls*.

[BS] LIMIT OF MODERATE WAVE ACTION. Line shown on FIRMs to indicate the inland limit of the 1-1/2-foot (457 mm) breaking wave height during the base flood.

[BS] LIMIT STATE. A condition beyond which a structure or member becomes unfit for service and is judged to be no longer useful for its intended function (serviceability limit state) or to be unsafe (strength limit state).

[F] LIQUID. A material that has a melting point that is equal to or less than 68°F (20°C) and a *boiling point* that is greater than 68°F (20°C) at 14.7 pounds per square inch absolute (psia) (101 kPa). When not otherwise identified, the term "liquid" includes both *flammable* and *combustible liquids.*

[F] LIQUID STORAGE ROOM. A room classified as a Group H-3 occupancy used for the storage of *flammable* or *combustible liquids* in a closed condition.

[F] LIQUID USE, DISPENSING AND MIXING ROOM. A room in which Class I, II and IIIA *flammable* or *combustible liquids* are *used*, dispensed or mixed in open containers.

[A] LISTED. Equipment, materials, products or services included in a list published by an organization acceptable to the *building* official and concerned with evaluation of products or services that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services and whose listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specified purpose.

[BG] LIVE/WORK UNIT. A *dwelling unit* or *sleeping unit* in which a significant portion of the space includes a nonresidential use that is operated by the tenant.

[BS] LIVE LOAD. A *load* produced by the use and occupancy of the building or other structure that does not include construction or environmental *loads* such as wind load, snow load, rain load, earthquake load, flood load or *dead load*.

[BS] LIVE LOAD, ROOF. A *load* on a roof produced:

1. During maintenance by workers, equipment and materials;
2. During the life of the structure by movable objects such as planters or other similar small decorative appurtenances that are not occupancy related; or
3. By the use and occupancy of the roof such as for roof gardens or assembly areas.

[BS] LOAD AND RESISTANCE FACTOR DESIGN (LRFD). A method of proportioning structural members and their connections using load and *resistance factors* such that no applicable *limit state* is reached when the structure is subjected to appropriate *load* combinations. The term "LRFD" is used in the design of steel and wood structures.

[BS] LOAD EFFECTS. Forces and deformations produced in structural members by the applied *loads*.

[BS] LOAD FACTOR. A factor that accounts for deviations of the actual *load* from the *nominal load*, for uncertainties in the analysis that transforms the *load* into a *load effect*, and for the probability that more than one extreme *load* will occur simultaneously.

[BS] LOADS. Forces or other actions that result from the weight of building materials, occupants and their possessions, environmental effects, differential movement and restrained dimensional changes. Permanent loads are those loads in which variations over time are rare or of small magnitude, such as *dead loads*. All other loads are variable loads (see "*Nominal loads*").

[BG] LODGING HOUSE. A one-family dwelling where one or more occupants are primarily permanent in nature and rent is paid for guest rooms.

[A] LOT. A portion or parcel of land considered as a unit.

[A] LOT LINE. A line dividing one lot from another, or from a street or any public place.

[BE] LOW-ENERGY POWER-OPERATED DOOR. A swinging, sliding or folding door that opens automatically upon an action by a pedestrian such as pressing a push plate or waving a hand in front of a sensor. The door closes automatically, and operates with decreased forces and decreased speeds (see "Power-assisted door" and "Power-operated door").

[F] LOWER FLAMMABLE LIMIT (LFL). The minimum concentration of vapor in air at which propagation of flame will occur in the presence of an ignition source. The LFL is sometimes referred to as "LEL" or "lower explosive limit."

[BS] LOWEST FLOOR. The lowest floor of the lowest enclosed area, including *basement*, but excluding any unfinished or flood-resistant enclosure, usable solely for vehicle parking, building access or limited storage provided that such enclosure is not built so as to render the structure in violation of Section 1612.

[W] MAILBOXES. Receptacles for the receipt of documents, packages or other deliverable matter. *Mailboxes* include, but are not limited to, post office boxes and receptacles provided by commercial mail-receiving agencies, apartment houses and schools.

[BS] MAIN WINDFORCE-RESISTING SYSTEM. An assemblage of structural elements assigned to provide support and stability for the overall structure. The system generally receives wind loading from more than one surface

MALL BUILDING, COVERED and MALL BUILDING, OPEN. See "Covered mall building."

[F] MANUAL FIRE ALARM BOX. A manually operated device used to initiate an *alarm signal*.

[A] MANUFACTURER'S DESIGNATION. An identification applied on a product by the manufacturer indicating that a product or material complies with a specified standard or set of rules (see "*Label*" and "*Mark*").

MARINA. A facility, generally on the waterfront, that stores and services boats in berths, on moorings, and in dry storage or dry stack storage.

[A] MARK. An identification applied on a product by the manufacturer indicating the name of the manufacturer and the function of a product or material (see "*Label*" and "Manufacturer's designation").

[BG] MARQUEE. ((~~A *canopy* that has a top surface which is sloped less than 25 degrees from the horizontal and is located less than 10 feet (3048 mm) from operable openings above or adjacent to the level of the marquee.~~)) *Marquees* are a type of *canopy*. See "canopy".

[BS] MASONRY. A built-up construction or combination of building units or materials of clay, shale, concrete, glass, gypsum, stone or other *approved* units bonded together with or without *mortar* or grout or other accepted methods of joining.

Glass unit masonry. Masonry composed of glass units bonded by *mortar*.

Plain masonry. Masonry in which the tensile resistance of the masonry is taken into consideration and the effects of stresses in reinforcement are neglected.

Reinforced masonry. Masonry construction in which reinforcement acting in conjunction with the masonry is used to resist forces.

Solid masonry. Masonry consisting of solid masonry units laid contiguously with the *joints* between the units filled with *mortar*.

Unreinforced (plain) masonry. Masonry in which the tensile resistance of masonry is taken into consideration and the resistance of the reinforcing steel, if present, is neglected.

[BS] MASONRY UNIT. *Brick*, tile, stone, glass block or concrete block conforming to the requirements specified in Section 2103.

Hollow. A masonry unit whose net cross-sectional *area* in any plane parallel to the load-bearing surface is less than 75 percent of its gross cross-sectional *area* measured in the same plane.

Solid. A masonry unit whose net cross-sectional *area* in every plane parallel to the load-bearing surface is 75 percent or more of its gross cross-sectional *area* measured in the same plane.

[W] MASS TIMBER. Structural elements of Type IV construction primarily of solid, built-up, panelized or engineered wood products that meet minimum cross section dimensions of Type IV construction.

[BF] MASTIC FIRE-RESISTANT COATINGS. Liquid mixture applied to a substrate by brush, roller, spray or trowel that provides fire-resistant protection of a substrate when exposed to flame or intense heat.

[BE] MEANS OF EGRESS. A continuous and unobstructed path of vertical and horizontal egress travel from any occupied portion of a building or structure to a *public way*. A means of egress consists of three separate and distinct parts: the *exit access*, the *exit* and the *exit discharge*.

[BG] MECHANICAL-ACCESS OPEN PARKING GARAGES. *Open parking garages* employing parking machines, lifts, elevators or other mechanical devices for vehicles moving from and to street level and in which public occupancy is prohibited above the street level.

[BF] MECHANICAL EQUIPMENT SCREEN. A rooftop structure, not covered by a roof, used to aesthetically conceal plumbing, electrical or mechanical equipment from view.

[BG] MEDICAL CARE. Care involving medical or surgical procedures, nursing or for psychiatric purposes.

[BG] MEMBRANE-COVERED CABLE STRUCTURE. A nonpressurized structure in which a mast and cable system provides support and tension to the membrane weather barrier and the membrane imparts stability to the structure.

[BG] MEMBRANE-COVERED FRAME STRUCTURE. A nonpressurized building wherein the structure is composed of a rigid framework to support a tensioned membrane which provides the weather barrier.

[BF] MEMBRANE PENETRATION. A breach in one side of a floor-ceiling, roof-ceiling or wall assembly to accommodate an item installed into or passing through the breach.

[BF] MEMBRANE-PENETRATION FIRESTOP. A material, device or construction installed to resist for a prescribed time period the passage of flame and heat through openings in a protective membrane in order to accommodate cables, cable trays, conduit, tubing, pipes or similar items.

[BF] MEMBRANE-PENETRATION FIRESTOP SYSTEM. An assemblage consisting of a fire-resistance-rated floor-ceiling, roof-ceiling or wall assembly, one or more penetrating items installed into or passing through the breach in one side of the assembly and the materials or devices, or both, installed to resist the spread of fire into the assembly for a prescribed period of time.

[BE] MERCHANDISE PAD. A merchandise pad is an area for display of merchandise surrounded by *aisles*, permanent fixtures or walls. Merchandise pads contain elements such as nonfixed and moveable fixtures, cases, racks, counters and partitions as indicated in Section 105.2 from which customers browse or shop.

[BF] METAL COMPOSITE MATERIAL (MCM). A factory-manufactured panel consisting of metal skins bonded to both faces of a solid plastic core.

[BF] METAL COMPOSITE MATERIAL (MCM) SYSTEM. An *exterior wall covering* fabricated using MCM in a specific assembly including *joints*, seams, attachments, substrate, framing and other details as appropriate to a particular design.

[BS] METAL ROOF PANEL. An interlocking metal sheet having a minimum installed weather exposure of 3 square feet (0.279 m^2) per sheet.

[BS] METAL ROOF SHINGLE. An interlocking metal sheet having an installed weather exposure less than 3 square feet (0.279 m^2) per sheet.

[BG] MEZZANINE. An intermediate level or levels between the floor and ceiling of any *story* and in accordance with Section 505.

[BS] MICROPILE. A micropile is a bored, grouted-in-place *deep foundation* element that develops its load-carrying capacity by means of a bond zone in soil, bedrock or a combination of soil and bedrock.

[BF] MINERAL BOARD. A rigid felted thermal insulation board consisting of either felted *mineral fiber* or cellular beads of expanded aggregate formed into flat rectangular units.

[BF] MINERAL FIBER. Insulation composed principally of fibers manufactured from rock, slag or glass, with or without binders.

[BF] MINERAL WOOL. Synthetic vitreous fiber insulation made by melting predominately igneous rock or furnace slag, and other inorganic materials, and then physically forming the melt into fibers.

[BS] MODIFIED BITUMEN ROOF COVERING. One or more layers of polymer-modified asphalt sheets. The sheet materials shall be fully adhered or mechanically attached to the substrate or held in place with an *approved* ballast layer.

[BS] MORTAR. A mixture consisting of cementitious materials, fine aggregates, water, with or without admixtures, that is used to construct unit masonry assemblies.

[BS] MORTAR, SURFACE-BONDING. A mixture to bond concrete *masonry units* that contains hydraulic cement, glass fiber reinforcement with or without inorganic fillers or organic modifiers and water.

[BE] MULTILEVEL ASSEMBLY SEATING. Seating that is arranged in distinct levels where each level is comprised of either multiple rows, or a single row of box seats accessed from a separate level.

[F] MULTIPLE-STATION ALARM DEVICE. Two or more single-station alarm devices that can be interconnected such that actuation of one causes all integral or separate audible alarms to operate. A multiple-station alarm device can consist of one single-station alarm device having connections to other detectors or to a *manual fire alarm box*.

[F] MULTIPLE-STATION SMOKE ALARM. Two or more single-station alarm devices that are capable of interconnection such that actuation of one causes the appropriate *alarm signal* to operate in all interconnected alarms.

[BE] MULTISTORY UNIT. A *dwelling unit* or *sleeping unit* with *habitable space* located on more than one *story*.

[BS] NAILING, BOUNDARY. A special nailing pattern required by design at the boundaries of *diaphragms*.

[BS] NAILING, EDGE. A special nailing pattern required by design at the edges of each panel within the assembly of a *diaphragm* or *shear wall*.

[BS] NAILING, FIELD. Nailing required between the sheathing panels and framing members at locations other than *boundary nailing* and *edge nailing*.

[BS] NATURALLY DURABLE WOOD. The heartwood of the following species except for the occasional piece with corner sapwood, provided 90 percent or more of the width of each side on which it occurs is heartwood.

Decay resistant. Redwood, cedar, black locust and black walnut.

Termite resistant. Redwood, Alaska yellow cedar, Eastern red cedar and Western red cedar.

[W] NIGHTCLUB. An A-2 occupancy use under the 2006 International Building Code in which the aggregate area of concentrated use of unfixed chairs and standing space that is specifically designated and primarily used for dancing or viewing performers exceeds 350 square feet, excluding adjacent lobby areas. “Nightclub” does not include theaters with fixed seating, banquet halls, or lodge halls.

[BS] NOMINAL LOADS. The magnitudes of the *loads* specified in Chapter 16 (dead, live, soil, wind, snow, rain, *flood* and earthquake).

[BS] NOMINAL SIZE (LUMBER). The commercial size designation of width and depth, in standard sawn lumber and glued-laminated lumber *grades*; somewhat larger than the standard net size of dressed lumber, in accordance with DOCPS 20 for sawn lumber and with the ANSI/AWC NDS for glued-laminated lumber.

[BG] NONCOMBUSTIBLE MEMBRANE STRUCTURE. A membrane structure in which the membrane and all component parts of the structure are noncombustible.

[W] NONCOMBUSTIBLE PROTECTION FOR MASS TIMBER. Noncombustible material, in accordance with Section 703.5, designed to increase the fire-resistance rating and delay the combustion of mass timber.

NON-PRODUCTION LABORATORY FACILITY. A facility where the containers used for reactions, transfers, and other handling of chemicals are designed to be easily and safely manipulated by one person. It is a workplace where chemicals are used or synthesized on a nonproduction basis.

[BS] NONSTRUCTURAL CONCRETE. Any element made of plain or reinforced concrete that is not part of a structural system required to transfer either gravity or lateral loads to the ground.

NONSTRUCTURAL TRIM. The moldings, battens, caps, nailing strips, latticing or cutouts which are attached to the *sign structure*.

[F] NORMAL TEMPERATURE AND PRESSURE (NTP). A temperature of 70°F (21°C) and a pressure of 1 atmosphere [14.7 psia (101 kPa)].

Class 4. An oxidizer that can undergo an explosive reaction due to contamination or exposure to thermal or physical shock and that causes a severe increase in the burning rate of combustible materials with which it comes into contact. Additionally, the oxidizer causes a severe increase in the burning rate and can cause spontaneous ignition of combustibles.

Class 3. An oxidizer that causes a severe increase in the burning rate of combustible materials with which it comes in contact.

Class 2. An oxidizer that will cause a moderate increase in the burning rate of combustible materials with which it comes in contact.

Class 1. An oxidizer that does not moderately increase the burning rate of combustible materials.

[F] OXIDIZING GAS. A gas that can support and accelerate combustion of other materials more than air does.

[BS] PANEL (PART OF A STRUCTURE). The section of a floor, wall or roof comprised between the supporting frame of two adjacent rows of columns and girders or column bands of floor or roof construction.

[BE] PANIC HARDWARE. A door-latching assembly incorporating a device that releases the latch upon the application of a force in the direction of egress travel. See "Fire exit hardware."

[BS] PARTICLEBOARD. A generic term for a panel primarily composed of cellulosic materials (usually wood), generally in the form of discrete pieces or particles, as distinguished from fibers. The cellulosic material is combined with synthetic resin or other suitable bonding system by a process in which the interparticle bond is created by the bonding system under heat and pressure.

[BF] PENETRATION FIRESTOP. A through-penetration firestop or a *membrane-penetration firestop*.

[BG] PENTHOUSE. An enclosed, unoccupied rooftop structure used for sheltering mechanical and electrical equipment, tanks, elevators and related machinery, and vertical *shaft* openings.

[BS] PERFORMANCE CATEGORY. A designation of wood structural panels as related to the panel performance used in Chapter 23.

[A] PERMIT. An official document or certificate issued by the *building official* that authorizes performance of a specified activity.

[A] PERSON. An individual, ((~~heirs, executors, administrators or assigns, and also includes a~~)) receiver, administrator, executor, assignee, trustee in bankruptcy, trust estate, firm, partnership, ((~~or~~)) joint venture, club, company, joint stock company, business trust, municipal corporation, political subdivision of the State of Washington, the State of Washington and any instrumentality thereof, corporation, ((~~its or their successors or assigns, or the agent of any of the aforesaid~~)) limited liability company, association, society or any group of individuals acting as a unit, whether mutual, cooperative, fraternal, nonprofit or otherwise, and the United States or any instrumentality thereof.

[BG] PERSONAL CARE SERVICE. The care of persons who do not require *medical care*. Personal care involves responsibility for the safety of the persons while inside the building

[BE] PHOTOLUMINESCENT. Having the property of emitting light that continues for a length of time after excitation by visible or invisible light has been removed.

[BS] PHOTOVOLTAIC MODULE. A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of tracker, designed to generate DC power when exposed to sunlight.

[BS] PHOTOVOLTAIC PANEL. A collection of modules mechanically fastened together, wired and designed to provide a field-installable unit.

[BS] PHOTOVOLTAIC PANEL SYSTEM. A system that incorporates discrete photovoltaic panels, that converts solar radiation into electricity, including rack support systems.

[BS] PHOTOVOLTAIC SHINGLES. A *roof covering* resembling shingles that incorporates photovoltaic modules.

[F] PHYSICAL HAZARD. A chemical for which there is evidence that it is a *combustible liquid*, *cryogenic fluid*, *explosive*, flammable (*solid*, *liquid* or gas), *organic peroxide* (*solid* or *liquid*), *oxidizer* (*solid* or *liquid*), *oxidizing gas*, *pyrophoric* (*solid*, *liquid* or gas), *unstable (reactive) material* (*solid*, *liquid* or gas) or *water-reactive material* (*solid* or *liquid*).

[F] PHYSIOLOGICAL WARNING THRESHOLD LEVEL. A concentration of airborne contaminants, normally expressed in parts per million (ppm) or milligrams per cubic meter (mg/m^3), that represents the concentration at which persons can sense the presence of the contaminant due to odor, irritation or other quick-acting physiological response. When used in conjunction with the permissible exposure limit (PEL) the physiological warning threshold levels are those consistent with the classification system used to establish the PEL. See the definition of "Permissible exposure limit (PEL)" in the *International Fire Code*.

PIER. A structure, usually of greater length than width, of timber, stone, concrete or other material, having a deck and projecting from the shore into waters so that boats may be moored alongside for loading, unloading, storage, repairs or commercial uses.

PLACE OF RELIGIOUS WORSHIP. See "Religious worship, place of."

[BF] PLASTIC, APPROVED. Any thermoplastic, thermosetting or reinforced thermosetting plastic material that conforms to combustibility classifications specified in the section applicable to the application and plastic type.

[BF] PLASTIC COMPOSITE. A generic designation that refers to wood/plastic composites, plastic lumber and similar materials.

[BF] PLASTIC GLAZING. Plastic materials that are glazed or set in a frame or sash.

[BF] PLASTIC LUMBER. A manufactured product made primarily of plastic materials (filled or unfilled) which is generally rectangular in cross section.

[BG] PLATFORM. A raised area within a building used for worship, the presentation of music, plays or other entertainment; the head table for special guests; the raised area for lecturers and speakers; boxing and wrestling rings; theater-in-the-round *stages*; and similar purposes wherein, other than horizontal sliding curtains, there are no overhead hanging curtains, drops, scenery or stage effects other than lighting and sound. A temporary platform is one installed for not more than 30 days.

[BF] POLYPROPYLENE SIDING. A shaped material, made principally from polypropylene homopolymer, or copolymer, which in some cases contains fillers or reinforcements, that is used to clad *exterior walls* of buildings.

[BS] PORCELAIN TILE. Tile that conforms to the requirements of ANSI A137.1.3, Section 3.0 for ceramic tile having an absorption of 0.5 percent or less in accordance with ANSI A137.1, Section 4.1 and Section 6.1 Table 10.

[W] PORTABLE SCHOOL CLASSROOM. A prefabricated structure consisting of one or more rooms with direct exterior egress from the classroom(s). The structure is transportable in one or more sections and is designed to be used as an educational space with or without a permanent foundation. The structure shall be capable of being demounted and relocated to other locations as needs arise.

[BS] POSITIVE ROOF DRAINAGE. The drainage condition in which consideration has been made for all loading deflections of the *roof deck*, and additional slope has been provided to ensure drainage of the roof within 48 hours of precipitation.

[BE] POWER-ASSISTED DOOR. Swinging door which opens by reduced pushing or pulling force on the door-operating hardware. The door closes automatically after the pushing or pulling force is released and functions with decreased forces. See "Low-energy power-operated door" and "Power-operated door."

[BE] POWER-OPERATED DOOR. Swinging, sliding, or folding door which opens automatically when approached by a pedestrian or opens automatically upon an action by a pedestrian. The door closes automatically and includes provisions such as presence sensors to prevent entrapment. See "Low energy power-operated door" and "Power-assisted door."

[BS] PREFABRICATED WOOD I-JOIST. Structural member manufactured using sawn or structural composite lumber flanges and wood structural panel webs bonded together with exterior exposure adhesives, which forms an "I" cross-sectional shape.

[BS] PRESTRESSED MASONRY. *Masonry* in which internal stresses have been introduced to counteract potential tensile stresses in *masonry* resulting from applied *loads*.

[BG] PRIMARY STRUCTURAL FRAME. The primary structural frame shall include all of the following structural members:

1. The columns.
2. Structural members having direct connections to the columns, including girders, beams, trusses and spandrels.
3. Members of the floor construction and roof construction having direct connections to the columns.
4. Bracing members that are essential to the vertical stability of the primary structural frame under gravity loading shall be considered part of the primary structural frame whether or not the bracing member carries gravity *loads*.

[BG] PRIVATE GARAGE. A building or portion of a building in which motor vehicles used by the owner or tenants of the building or buildings on the premises are stored or kept, without provisions for repairing or servicing such vehicles for profit.

PRIVATE TRANSFORMER VAULT. A vault that contains transformer equipment that is not owned by Seattle City Light or other electric power utility.

PROJECTING SIGN. A sign other than a wall sign, which projects from and is supported by a wall of a building or structure.

[BG] PROSCENIUM WALL. The wall that separates the *stage* from the auditorium or assembly seating area.

PSYCHIATRIC HOSPITALS. See "Hospitals."

[BE] PUBLIC ENTRANCE. An entrance that is not a *service entrance* or a *restricted entrance*.

[A] PUBLIC WAY. A street, alley or other parcel of land open to the outside air leading to a street, that has been deeded, dedicated or otherwise permanently appropriated to the public for public use and which has a clear width and height of not less than 10 feet (3048 mm).

[BE] PUBLIC-USE AREAS. Interior or exterior rooms or spaces that are made available to the general public.

[F] PYROPHORIC. A chemical with an auto-ignition temperature in air, at or below a temperature of 130°F (54.4°C).

[F] PYROTECHNIC COMPOSITION. A chemical mixture that produces visible light displays or sounds through a self-propagating, heat-releasing chemical reaction which is initiated by ignition.

[BF] RADIANT BARRIER. A material having a low-emittance surface of 0.1 or less installed in building assemblies.

[BE] RAMP. A walking surface that has a running slope steeper than one unit vertical in 20 units horizontal (5-percent slope).

RAMP, EXIT ACCESS. See "Exit access ramp."

RAMP, EXTERIOR EXIT. See "Exterior exit ramp."

RAMP, INTERIOR EXIT. See "Interior exit ramp."

[BG] RAMP-ACCESS OPEN PARKING GARAGES. *Open parking garages* employing a series of continuously rising floors or a series of interconnecting ramps between floors permitting the movement of vehicles under their own power from and to the street level.

[A] RECORD DRAWINGS. Drawings ("as builts") that document the location of all devices, appliances, wiring sequences, wiring methods and connections of the components of a *fire alarm system* as installed.

[BF] REFLECTIVE PLASTIC CORE INSULATION. An insulation material packaged in rolls, that is less than 1/2 inch (12.7 mm) thick, with not less than one exterior low-emittance surface (0.1 or less) and a core material containing voids or cells.

[A] REGISTERED DESIGN PROFESSIONAL. An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or *jurisdiction* in which the project is to be constructed.

[A] REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE. A *registered design professional* engaged by the owner or the owner's authorized agent to review and coordinate certain aspects of the project, as determined by the *building official*, for compatibility with the design of the building or structure, including submittal documents prepared by others, deferred submittal documents and phased submittal documents.

[BG] RELIGIOUS WORSHIP, PLACE OF. A building or portion thereof intended for the performance of religious services.

[A] RELOCATABLE BUILDING. A partially or completely assembled building constructed and designed to be reused multiple times and transported to different building sites.

[A] REPAIR. The reconstruction, replacement or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.

[BG] REPAIR GARAGE. ((~~A building, structure or portion thereof used for servicing or repairing motor vehicles.~~))

Major repair garage. A building or portions of a building where major repairs, such as engine overhauls, painting, body and fender work, and repairs that require draining of the motor vehicle fuel tank are performed on motor vehicles, including associated floor space used for offices, parking, or showrooms.

Minor repair garage. A building or portions of a building used for lubrication, inspection, and minor automotive maintenance work, such as engine tune-ups, replacement of parts, fluid changes (e.g., oil, antifreeze, transmission fluid, brake fluid, air conditioning refrigerants, etc.), brake system repairs, tire rotation, and similar routine maintenance work, including associated floor space used for offices, parking, or showrooms.

[BS] REROOFING. The process of recovering or replacing an existing *roof covering*. See "Roof recover" and "Roof replacement."

[BG] RESIDENTIAL AIRCRAFT HANGAR. An accessory building less than 2,000 square feet (186 m^2) and 20 feet (6096 mm) in *building height* constructed on a one- or two-family property where aircraft are stored. Such use will be considered as a residential accessory use incidental to the dwelling.

[W[RESIDENTIAL SLEEPING SUITES. A unit that provides multiple rooms or spaces for up to five residents, includes provisions for sleeping and can include provisions for living, eating, sanitation, and kitchen facilities.

[BS] RESISTANCE FACTOR. A factor that accounts for deviations of the actual strength from the *nominal strength* and the manner and consequences of failure (also called "strength reduction factor").

[BE] RESTRICTED ENTRANCE. An entrance that is made available for *common use* on a controlled basis, but not public use, and that is not a *service entrance*.

((~~**[BG] RETRACTABLE AWNING.** A retractable *awning* is a cover with a frame that retracts against a building or other structure to which it is entirely supported.~~))

[BS] RISK CATEGORY. A categorization of buildings and other structures for determination of *flood*, wind, snow, ice and earthquake *loads* based on the risk associated with unacceptable performance.

[BS] RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE_R) GROUND MOTION RESPONSE ACCELERATIONS. The most severe earthquake effects considered by this code, determined for the orientation that results in the largest maximum response to horizontal ground motions and with adjustment for targeted risk.

[BS] ROOF ASSEMBLY (For application to Chapter 15 only). A system designed to provide weather protection and resistance to design *loads.* The system consists of a *roof covering* and *roof deck* or a single component serving as both the roof covering and the *roof deck*. A roof assembly can include an underlayment, a thermal barrier, insulation or a *vapor retarder*.

[BS] ROOF COATING. A fluid-applied, adhered coating used for roof maintenance or *roof repair*, or as a component of a *roof covering system* or *roof assembly*.

[BS] ROOF COVERING. The covering applied to the *roof deck* for weather resistance, fire classification or appearance.

ROOF COVERING SYSTEM. See "Roof assembly."

[BS] ROOF DECK. The flat or sloped surface constructed on top of the *exterior walls* of a building or other supports for the purpose of enclosing the *story* below, or sheltering an area, to protect it from the elements, not including its supporting members or vertical supports.

ROOF DRAINAGE, POSITIVE. See "Positive roof drainage."

[BS] ROOF RECOVER. The process of installing an additional *roof covering* over a prepared existing *roof covering* without removing the existing *roof covering*.

[BS] ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of correcting damage or restoring the pre-damage condition.

[BS] ROOF REPLACEMENT. The process of removing the existing *roof covering*, repairing any damaged substrate and installing a new *roof covering*.

ROOF SIGN. A sign erected upon or above a roof or parapet of a building or structure.

[BG] ROOF VENTILATION. The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, *attics*, cathedral ceilings or other enclosed spaces over which a *roof assembly* is installed.

[BG] ROOFTOP STRUCTURE. A structure erected on top of the *roof deck* or on top of any part of a building.

[BS] RUNNING BOND. The placement of *masonry units* such that *head joints* in successive courses are horizontally offset at least one-quarter the unit length.

[BG] SALLYPORT. A security vestibule with two or more doors or gates where the intended purpose is to prevent continuous and unobstructed passage by allowing the release of only one door or gate at a time.

[BE] SCISSOR STAIRWAY. Two interlocking *stairways* providing two separate paths of egress located within one *exit* enclosure.

[BS] SCUPPER. An opening in a wall or parapet that allows water to drain from a roof.

[BG] SECONDARY MEMBERS. The following structural members shall be considered secondary members and not part of the *primary structural frame*:

1. Structural members not having direct connections to the columns.
2. Members of the floor construction and roof construction not having direct connections to the columns.
3. Bracing members other than those that are part of the *primary structural frame.*

Interpretation I202S: A *secondary member* (component or subsystem) is a structurally significant portion of the building that is supported by the *primary structural frame*, but which does not contribute to the strength or stability of the primary structure. *Secondary members* have internal structural integrity to perform their function and have their interactions with and attachments to, the *primary structural frame* analyzed and designed to assure proper integration within the total structure.

[BS] SEISMIC DESIGN CATEGORY. A classification assigned to a structure based on its *risk category* and the severity of the *design earthquake ground motion* at the site.

[BS] SEISMIC FORCE-RESISTING SYSTEM. That part of the structural system that has been considered in the design to provide the required resistance to the prescribed seismic forces.

[BF] SELF-CLOSING. As applied to a *fire door* or other opening protective, means equipped with an device that will ensure closing after having been opened.

[BE] SELF-LUMINOUS. Illuminated by a self-contained power source, other than batteries, and operated independently of external power sources.

SELF-PRESERVATION, INCAPABLE OF. See "Incapable of self-preservation."

[BG] SELF-SERVICE STORAGE FACILITY. Real property designed and used for the purpose of renting or leasing individual storage spaces to customers for the purpose of storing and removing personal property on a self-service basis.

[F] SERVICE CORRIDOR. A fully enclosed passage used for transporting *HPM* and purposes other than required *means of egress.*

[BE] SERVICE ENTRANCE. An entrance intended primarily for delivery of goods or services.

[BF] SHAFT. An enclosed space extending through one or more *stories* of a building, connecting vertical openings in successive floors, or floors and roof.

[BF] SHAFT ENCLOSURE. The walls or construction forming the boundaries of a *shaft*.

[BS] SHALLOW FOUNDATION. A shallow foundation is an individual or strip footing, a mat foundation, a slab-on-grade foundation or a similar foundation element.

[BS] SHEAR WALL (for Chapter 23). A wall designed to resist lateral forces parallel to the plane of a wall.

Shear wall, perforated. A wood structural panel sheathed wall with openings, that has not been specifically designed and detailed for force transfer around openings.

Shear wall segment, perforated. A section of shear wall with full-height sheathing that meets the height-to-width ratio limits of Section 4.3.4 of AWC SDPWS.

[BS] SHINGLE FASHION. A method of installing roof or wall coverings, water-resistive barriers, flashing or other building components such that upper layers of material are placed overlapping lower layers of material to provide for drainage via gravity and moisture control.

SIGN STRUCTURE. Any structure which supports or is designed to support any *display surface.*

[BS] SINGLE-PLY MEMBRANE. A roofing membrane that is field applied using one layer of membrane material (either homogeneous or composite) rather than multiple layers.

[F] SINGLE-STATION SMOKE ALARM. An assembly incorporating the detector, the control equipment and the alarm-sounding device in one unit, operated from a power supply either in the unit or obtained at the point of installation.

[BG] SITE. A parcel of land bounded by a *lot line* or a designated portion of a public right-of-way.

[BS] SITE CLASS. A classification assigned to a site based on the types of soils present and their engineering properties as defined in Section 1613.2.2.

[BS] SITE COEFFICIENTS. The values of F_a and F_v indicated in Tables 1613.2.3(1) and 1613.2.3(2), respectively.

[BG] SITE-FABRICATED STRETCH SYSTEM. A system, fabricated on site and intended for acoustical, tackable or aesthetic purposes, that is composed of three elements:

1. A frame (constructed of plastic, wood, metal or other material) used to hold fabric in place.
2. A core material (infill, with the correct properties for the application).
3. An outside layer, composed of a textile, fabric or vinyl, that is stretched taut and held in place by tension or mechanical fasteners via the frame.

[BS] SKYLIGHT, UNIT. A factory-assembled, glazed fenestration unit, containing one panel of glazing material that allows for natural lighting through an opening in the *roof assembly* while preserving the weather-resistant barrier of the roof.

[BS] SKYLIGHTS AND SLOPED GLAZING. Glass or other transparent or translucent glazing material installed at a slope of 15 degrees (0.26 rad) or more from vertical. Unit skylights, *tubular daylighting devices*, glazing materials, solariums, sunrooms, roofs and sloped walls are included in this definition.

[A] SLEEPING UNIT. A single unit that provides rooms or spaces for one or more persons, includes permanent provisions for sleeping and can include provisions for living, eating and either sanitation or kitchen facilities but not both. Such rooms and spaces that are also part of a dwelling unit are not sleeping units.

SLIP. A berthing space between or adjacent to *piers*, wharves, or docks; the water areas associated with boat moorage.

[W] SMALL BUSINESS. Any business entity (including a sole proprietorship, corporation, partnership or other legal entity) which is owned and operated independently from all other businesses, which has the purpose of making a profit, and which has 50 or fewer employees.

[F] SMOKE ALARM. A single- or multiple-station alarm responsive to smoke. See “Multiple-station smoke alarm” and “Single-station smoke alarm.”

[BF] SMOKE BARRIER. A continuous membrane, either vertical or horizontal, such as a wall, floor or ceiling assembly, that is designed and constructed to restrict the movement of smoke.

[BG] SMOKE COMPARTMENT. A space within a building enclosed by *smoke barriers* on all sides, including the top and bottom.

[BF] SMOKE DAMPER. A *listed* device installed in ducts and air transfer openings designed to resist the passage of smoke. The device is installed to operate *automatically*, controlled by a smoke detection system, and where required, is capable of being positioned from a *fire command center*.

[F] SMOKE DETECTOR. A *listed* device that senses visible or invisible particles of combustion.

[BF] SMOKE PARTITION. A wall assembly that extends from the top of the foundation or floor below to the underside of the floor or roof sheathing, deck or slab above or to the underside of the ceiling above where the ceiling membrane is constructed to limit the transfer of smoke.

[BF] SMOKE-DEVELOPED INDEX. A comparative measure, expressed as a dimensionless number, derived from measurements of smoke obscuration versus time for a material tested in accordance with ASTM E84.

((~~[BF] SMOKEPROOF ENCLOSURE.~~ ~~An *exit stairway* or *ramp* designed and constructed so that the movement of the products of combustion produced by a fire occurring in any part of the building into the enclosure is limited.~~))

[BE] SMOKE-PROTECTED ASSEMBLY SEATING. Seating served by *means of egress* that is not subject to smoke accumulation within or under a structure for a specified design time by means of passive design or by mechanical ventilation.

[BG] SOFT CONTAINED PLAY EQUIPMENT STRUCTURE. A children's play structure containing one or more components where the user enters a play environment that utilizes pliable materials.

[F] SOLID. A material that has a melting point, decomposes or sublimes at a temperature greater than 68°F (20°C).

[BG] SPECIAL AMUSEMENT BUILDING. A special amusement building is any temporary or permanent building or portion thereof that is occupied for amusement, entertainment or educational purposes and that contains a device or system that conveys passengers or provides a walkway along, around or over a course in any direction so arranged that the *means of egress* path is not readily apparent due to visual or audio distractions or is intentionally confounded or is not readily available because of the nature of the attraction or mode of conveyance through the building or structure.

[BS] SPECIAL FLOOD HAZARD AREA. The land area subject to flood hazards and shown on a *Flood Insurance Rate Map* or other flood hazard map as Zone A, AE, A1-30, A99, AR, AO, AH, V, VO, VE or V1-30.

[BS] SPECIAL INSPECTION. Inspection of construction requiring the expertise of an *approved special inspector* in order to ensure compliance with this code and the *approved construction documents*.

Continuous special inspection. Special inspection by the *special inspector* who is present continuously when and where the work to be inspected is being performed.

Periodic special inspection. Special inspection by the *special inspector* who is intermittently present where the work to be inspected has been or is being performed.

[BS] SPECIAL INSPECTOR. A qualified person employed or retained by an *approved* agency and *approved* by the *building official* as having the competence necessary to inspect a particular type of construction requiring *special inspection.*

[BS] SPECIAL STRUCTURAL WALL. See Section 1905.1.1.

[BS] SPECIFIED COMPRESSIVE STRENGTH OF MASONRY, f'_m. Minimum compressive strength, expressed as force per unit of net cross-sectional area, required of the *masonry* used in construction by the *approved construction documents*, and upon which the project design is based. Whenever the quantity f'_m is under the radical sign, the square root of numerical value only is intended and the result has units of pounds per square inch (psi) (MPa).

[BF] SPLICE. The result of a factory and/or field method of joining or connecting two or more lengths of a *fire-resistant joint system* into a continuous entity.

SPORT ACTIVITY, AREA OF. See "Area of sport activity."

[F] SPRAY ROOM. A room designed to accommodate spraying operations.

[BF] SPRAYED FIRE-RESISTANT MATERIALS. Cementitious or fibrous materials that are sprayed to provide fire-resistant protection of the substrates.

[BG] STAGE. A space within a building utilized for entertainment or presentations, which includes overhead hanging curtains, drops, scenery or stage effects other than lighting and sound.

[W] STAGED EVACUATION. A method of emergency response that engages building components and trained staff to provide occupant safety during an emergency. Emergency response involves moving or holding certain occupants at temporary locations for a brief period of time before evacuating the building. This response is used by ambulatory surgery facility and *assisted living facilities* to protect the health and safety of fragile occupants and residents.

[BE] STAIR. A change in elevation, consisting of one or more risers.

[BE] STAIRWAY. One or more *flights* of *stairs*, either exterior or interior, with the necessary landings and platforms connecting them, to form a continuous and uninterrupted passage from one level to another.

STAIRWAY, EXIT ACCESS. See "Exit access stairway."

STAIRWAY, EXTERIOR EXIT. See "Exterior exit stairway."

STAIRWAY, INTERIOR EXIT. See "Interior exit stairway."

STAIRWAY, SCISSOR. See "Scissor stairway."

[BE] STAIRWAY, SPIRAL. A *stairway* having a closed circular form in its plan view with uniform section-shaped treads attached to and radiating from a minimum-diameter supporting column.

((~~**[F] STANDBY POWER SYSTEM.** A source of automatic electric power of a required capacity and duration to operate required building, hazardous materials or ventilation systems in the event of a failure of the primary power. Standby power systems are required for electrical loads where interruption of the primary power could create hazards or hamper rescue or fire-fighting operations.~~))

STANDBY POWER SYSTEM, LEGALLY REQUIRED. An electrical power system that complies with *Seattle Electrical Code* Article 701, Legally Required Standby Systems, and Chapter 27.

[F] STANDPIPE, TYPES OF. Standpipe types are as follows:

Automatic dry. A dry standpipe system, normally filled with pressurized air, that is arranged through the use of a device, such as dry pipe valve, to admit water into the system piping *automatically* upon the opening of a hose valve. The water supply for an *automatic* dry standpipe system shall be capable of supplying the system demand.

Automatic wet. A wet standpipe system that has a water supply that is capable of supplying the system demand *automatically*.

Manual dry. A dry standpipe system that does not have a permanent water supply attached to the system. Manual dry standpipe systems require water from a fire department pumper to be pumped into the system through the fire department connection in order to meet the system demand.

Manual wet. A wet standpipe system connected to a water supply for the purpose of maintaining water within the system but does not have a water supply capable of delivering the system demand attached to the system. Manual-wet standpipe systems require water from a fire department pumper (or the like) to be pumped into the system in order to meet the system demand.

Semiautomatic dry. A dry standpipe system that is arranged through the use of a device, such as a deluge valve, to admit water into the system piping upon activation of a remote control device located at a hose connection. A remote control activation device shall be provided at each hose connection. The water supply for a semiautomatic dry standpipe system shall be capable of supplying the system demand.

[F] STANDPIPE SYSTEM, CLASSES OF. Standpipe classes are as follows:

Class I system. A system providing 2-1/2-inch (64 mm) hose connections to supply water for use by fire departments and those trained in handling heavy fire streams.

Class II system. A system providing 1-1/2-inch (38 mm) hose stations to supply water for use primarily by the building occupants or by the fire department during initial response.

Class III system. A system providing 1-1/2-inch (38 mm) hose stations to supply water for use by building occupants and 2-1/2-inch (64 mm) hose connections to supply a larger volume of water for use by fire departments and those trained in handling heavy fire streams.

[BS] STEEL CONSTRUCTION, COLD-FORMED. That type of construction made up entirely or in part of *steel structural members* cold formed to shape from sheet or strip steel such as *roof deck*, floor and wall panels, studs, floor joists, roof joists and other structural elements.

[BS] STEEL ELEMENT, STRUCTURAL. Any *steel structural member* of a building or structure consisting of rolled shapes, pipe, hollow structural sections, plates, bars, sheets, rods or steel castings other than cold-formed steel or steel joist members.

[BS] STEEL JOIST. Any *steel structural member* of a building or structure made of hot-rolled or cold-formed solid or open-web sections, or riveted or welded bars, strip or sheet steel members, or slotted and expanded, or otherwise deformed rolled sections.

[BF] STEEP SLOPE. A roof slope greater than two units vertical in 12 units horizontal (17-percent slope).

[BS] STONE MASONRY. *Masonry* composed of field, quarried or *cast stone* units bonded by *mortar*.

[F] STORAGE, HAZARDOUS MATERIALS. The keeping, retention or leaving of hazardous materials in closed containers, tanks, cylinders, or similar vessels; or vessels supplying operations through closed connections to the vessel.

[BS] STORAGE RACKS. Cold-formed or hot-rolled steel structural members which are formed into steel storage racks, including pallet storage racks, movable-shelf racks, rack-supported systems, automated storage and retrieval systems (stacker

racks), push-back racks, pallet-flow racks, case-flow racks, pick modules and rack-supported platforms. Other types of racks, such as drive-in or drive-through racks, cantilever racks, portable racks or racks made of materials other than steel, are not considered storage racks for the purpose of this code.

[BG] STORM SHELTER. A building, structure or portions thereof, constructed in accordance with ICC 500 and designated for use during a severe wind storm event, such as a hurricane or tornado.

Community storm shelter. A storm shelter not defined as a "Residential storm shelter."

Residential storm shelter. A storm shelter serving occupants of *dwelling units* and having an *occupant load* not exceeding 16 persons.

[BG] STORY. That portion of a building, ((~~included~~)) including basements, located between the upper surface of a floor and the upper surface of the next floor or roof ((~~next~~)) above (see *"Basement," "Building height," "Grade plane" and "Mezzanine"*). A story is measured as the vertical distance from top to top of two successive tiers of beams or finished floor surfaces and, for the topmost story, from the top of the floor finish to the top of the ceiling joists or, where there is not a ceiling, to the top of the roof rafters.

[BG] STORY ABOVE GRADE PLANE. Any *story* having its finished floor surface entirely above *grade plane*, or in which the finished surface of the next floor ((~~next~~)) above is:

1. More than 6 feet (1829 mm) above *grade plane*; or
2. More than 12 feet (3658 mm) above the finished ground level ((~~at any point~~)) for more than 25 feet (7620 mm) of the perimeter. Required driveways up to 22 feet (6706 mm) wide shall not be considered in calculating the 25 foot distance if there is at least 10 feet (3048 mm) between the driveway and all portions of the 25 foot area. See Figure 202S.

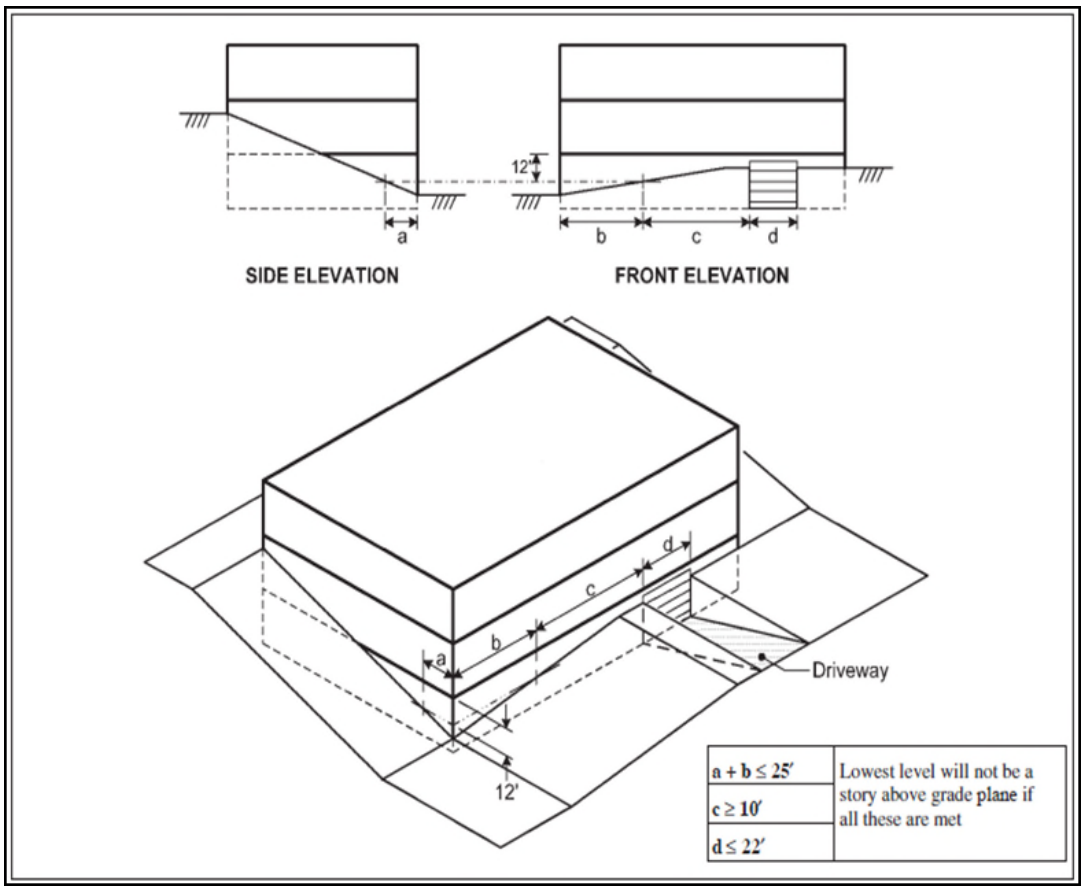


FIGURE 202S
STORY ABOVE GRADE PLANE

[BS] STRENGTH (For Chapter 21).

Design strength. Nominal strength multiplied by a strength reduction factor.

Nominal strength. Strength of a member or cross section calculated in accordance with these provisions before application of any strength-reduction factors.

Required strength. Strength of a member or cross section required to resist *factored loads*.

[BS] STRENGTH (for Chapter 16).

Nominal strength. The capacity of a structure or member to resist the effects of *loads*, as determined by computations using *specified* material strengths and dimensions and equations derived from accepted principles of structural mechanics or by field tests or laboratory tests of scaled models, allowing for modeling effects and differences between laboratory and field conditions.

Required strength. Strength of a member, cross section or connection required to resist *factored loads* or related internal moments and forces in such combinations as stipulated by these provisions.

Strength design. A method of proportioning structural members such that the computed forces produced in the members by *factored loads* do not exceed the member design strength [also called "*load and resistance factor design*" (LRFD)]. The term "strength design" is used in the design of concrete and *masonry* structural elements.

[BS] STRUCTURAL COMPOSITE LUMBER. Structural member manufactured using wood elements bonded together with exterior adhesives. Examples of structural composite lumber are:

Laminated strand lumber (LSL). A composite of wood strand elements with wood fibers primarily oriented along the length of the member, where the least dimension of the wood strand elements is 0.10 inch (2.54 mm) or less and their average lengths not less than 150 times the least dimension of the wood strand elements.

Laminated veneer lumber (LVL). A composite of wood *veneer* sheet elements with wood fibers primarily oriented along the length of the member, where the *veneer* element thicknesses are 0.25 inches (6.4 mm) or less.

Oriented strand lumber (OSL). A composite of wood strand elements with wood fibers primarily oriented along the length of the member, where the least dimension of the wood strand elements is 0.10 inches (2.54 mm) or less and their average lengths not less than 75 times and less than 150 times the least dimension of the strand elements.

Parallel strand lumber (PSL). A composite of wood strand elements with wood fibers primarily oriented along the length of the member where the least dimension of the wood strand elements is 0.25 inches (6.4 mm) or less and their average lengths not less than 300 times the least dimension of the wood strand elements.

STRUCTURAL ENGINEER IN RESPONSIBLE CHARGE. A structural engineer licensed to practice under the laws of the State of Washington who is engaged by the owner to review and coordinate structural design aspects of the project, as determined by the *building official*, for compatibility with the design of the building or structure, including submittal documents prepared by others, *deferred submittal* documents and phased submittal documents.

[BS] STRUCTURAL GLUED-LAMINATED TIMBER. An engineered, stress-rated product of a timber laminating plant, comprised of assemblies of specially selected and prepared wood laminations in which the grain of all laminations is approximately parallel longitudinally and the laminations are bonded with adhesives.

[BS] STRUCTURAL OBSERVATION. The visual observation of the structural system by a *registered design professional* for general conformance to the *approved construction documents*.

STRUCTURALLY QUALIFIED PRODUCTS. Products that have been prequalified based on current acceptance and certification by an accepted authority such as International Code Council (ICC), American Society for Testing and Materials (ASTM), American Concrete Institute (ACI), American Institute of Steel Construction (AISC), or others widely accepted in the engineering field.

[A] STRUCTURE. That which is built or constructed.

[BS] SUBSTANTIAL DAMAGE. Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

[BS] SUBSTANTIAL IMPROVEMENT. Any *repair*, reconstruction, rehabilitation, *alteration*, *addition* or other improvement of a building or structure, the cost of which, in any five-year period, equals or exceeds 50 percent of the market value of the structure before the improvement or repair is started. If the structure has sustained *substantial damage*, any *repairs* are considered substantial improvement regardless of the actual *repair* work performed. The term does not, however, include either:

1. Any project for improvement of a building required to correct existing health, sanitary or safety code violations identified by the *building official* and that are the minimum necessary to assure safe living conditions.
2. Any *alteration* of a historic structure provided that the *alteration* will not preclude the structure's continued designation as a historic structure.

SUBSTRUCTURE. The portion of the construction below and including the deck immediately above the water.

[BG] SUNROOM. A one-*story* structure attached to a building with a glazing area in excess of 40 percent of the gross area of the structure's *exterior walls* and roof.

SUPERSTRUCTURE. The portion of construction above the deck.

Exception: *Covered boat moorage*.

[F] SUPERVISING STATION. A facility that receives signals and at which personnel are in attendance at all times to respond to these signals.

[F] SUPERVISORY SERVICE. The service required to monitor performance of guard tours and the operative condition of fixed suppression systems or other systems for the protection of life and property.

[F] SUPERVISORY SIGNAL. A signal indicating the need of action in connection with the supervision of guard tours, the fire suppression systems or equipment or the maintenance features of related systems.

[F] SUPERVISORY SIGNAL-INITIATING DEVICE. An initiation device, such as a valve supervisory switch, water-level indicator or low-air pressure switch on a dry-pipe sprinkler system, whose change of state signals an off-normal condition and its restoration to normal of a fire protection or life safety system, or a need for action in connection with guard tours, fire suppression systems or equipment or maintenance features of related systems.

[BS] SUSCEPTIBLE BAY. A roof or portion thereof with either of the following:

1. A slope less than 1/4-inch per foot (0.0208 rad).
2. On which water is impounded, in whole or in part, and the secondary drainage system is functional but the primary drainage system is blocked.

A roof surface with a slope of 1/4-inch per foot (0.0208 rad) or greater towards points of free drainage is not a susceptible bay.

[BG] SWIMMING POOL. Any structure intended for swimming, recreational bathing or wading that contains water over 24 inches (610 mm) deep. This includes in-ground, above-ground and on-ground pools; hot tubs; spas and fixed-in-place wading pools.

[BF] T RATING. The time period that the *penetration firestop system*, including the penetrating item, limits the maximum temperature rise to 325°F (163°C) above its initial temperature through the penetration on the nonfire side when tested in accordance with ASTM E814 or UL 1479.

[BG] TECHNICAL PRODUCTION AREA. Open elevated areas or spaces intended for entertainment technicians to walk on and occupy for servicing and operating entertainment technology systems and equipment. Galleries, including fly and lighting galleries, gridirons, catwalks, and similar areas are designed for these purposes.

[BG] TENSILE MEMBRANE STRUCTURE. A membrane structure having a shape that is determined by tension in the membrane and the geometry of the support structure. Typically, the structure consists of both flexible elements (e.g., membrane and cables), nonflexible elements (e.g., struts, masts, beams and arches) and the anchorage (e.g., supports and foundations). This includes frame-supported tensile membrane structures.

[F] TENT. A structure, enclosure, umbrella structure or shelter, with or without sidewalls or drops, constructed of fabric or pliable material supported in any manner except by air or the contents it protects (see "Umbrella structure").

[BG] THERMAL ISOLATION. A separation of conditioned spaces, between a *sunroom* and a *dwelling unit*, consisting of existing or new walls, doors or windows.

[BF] THERMOPLASTIC MATERIAL. A plastic material that is capable of being repeatedly softened by increase of temperature and hardened by decrease of temperature.

[BF] THERMOSETTING MATERIAL. A plastic material that is capable of being changed into a substantially nonreformable product when cured.

[BF] THROUGH PENETRATION. A breach in both sides of a floor, floor-ceiling or wall assembly to accommodate an item passing through the breaches**.**

[BF] THROUGH-PENETRATION FIRESTOP SYSTEM. An assemblage consisting of a fire-resistance-rated floor, floor-ceiling, or wall assembly, one or more penetrating items passing through the breaches in both sides of the assembly and the materials or devices, or both, installed to resist the spread of fire through the assembly for a prescribed period of time.

[BS] TIE, WALL. Metal connector that connects *wythes* of *masonry* walls together.

[BS] TIE-DOWN (HOLD-DOWN). A device used to resist uplift of the chords of *shear walls.*

[BS] TILE, STRUCTURAL CLAY. A hollow *masonry unit* composed of burned clay, shale, fire clay or mixture thereof, and having parallel *cells*.

[F] TIRES, BULK STORAGE OF. Storage of tires where the area available for storage exceeds 20,000 cubic feet (566 m^3).

[A] TOWNHOUSE. A ((~~single-family *dwelling unit* constructed in a group of~~)) *building* that contains three or more attached townhouse units. ((~~in which each unit extends from the foundation to roof and with open space on at least two sides.~~))

TOWNHOUSE UNIT. A single-family dwelling unit in a townhouse that extends from foundation to roof and that has a yard or public way on not less than two sides that extends at least 50 percent of the length of each of these two sides.

[F] TOXIC. A chemical falling within any of the following categories:

1. A chemical that has a median lethal dose (LD_{50}) of more than 50 milligrams per kilogram, but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
2. A chemical that has a median lethal dose (LD_{50}) of more than 200 milligrams per kilogram, but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.
3. A chemical that has a median lethal concentration (LC_{50}) in air of more than 200 parts per million, but not more than 2,000 parts per million by volume of gas or vapor, or more than 2 milligrams per liter but not more than 20 milligrams per liter of mist, fume or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

[BG] TRANSIENT. Occupancy of a *dwelling unit* or *sleeping unit* for not more than 30 days.

[BG] TRANSIENT AIRCRAFT. Aircraft based at another location and that is at the transient location for not more than 90 days.

[W] TRANSIENT LODGING. A building, facility or portion thereof, excluding inpatient medical care facilities and long-term care facilities, that contains one or more *dwelling units* or sleeping units. Examples of *transient lodging* include, but are not limited to, resorts, group homes, hotels, motels, dormitories, homeless shelters, halfway houses and social service lodging.

[BS] TREATED WOOD. Wood products that are conditioned to enhance fire-retardant or preservative properties.

Fire-retardant-treated wood. Wood products that, when impregnated with chemicals by a pressure process or other means during manufacture, exhibit reduced surface-burning characteristics and resist propagation of fire.

Preservative-treated wood. Wood products that, conditioned with chemicals by a pressure process or other means, exhibit reduced susceptibility to damage by fungi, insects or marine borers.

[BF] TRIM. Picture molds, chair rails, baseboards, *handrails*, door and window frames and similar decorative or protective materials used in fixed applications.

[F] TROUBLE SIGNAL. A signal initiated by the *fire alarm system* or device indicative of a fault in a monitored circuit or component.

[BS] TSUNAMI DESIGN GEODATABASE. The ASCE database (version 2016-1.0) of Tsunami Design Zone maps and associated design data for the states of Alaska, California, Hawaii, Oregon and Washington.

[BS] TSUNAMI DESIGN ZONE. An area identified on the Tsunami Design Zone map between the shoreline and the inundation limit, within which certain structures designated in Chapter 16 are designed for or protected from inundation.

[BS] TUBULAR DAYLIGHTING DEVICE (TDD). A non-operable *fenestration* unit primarily designed to transmit daylight from a roof surface to an interior ceiling via a tubular conduit. The basic unit consists of an exterior glazed weathering surface, a light-transmitting tube with a reflective interior surface, and an interior-sealing device such as a translucent ceiling panel. The unit can be factory assembled, or field-assembled from a manufactured kit.

24-HOUR BASIS. See "24-hour basis" located preceding "AAC masonry."

[BE] TYPE A UNIT. A *dwelling unit* or *sleeping unit* designed and constructed for accessibility in accordance with this code and the provisions for *Type A units* in ICC A117.1.

[BE] TYPE B UNIT. A *dwelling unit* or *sleeping unit* designed and constructed for accessibility in accordance with this code and the provisions for *Type B units* in ICC A117.1, consistent with the design and construction requirements of the federal Fair Housing Act.

[F] UMBRELLA STRUCTURE. A structure, enclosure or shelter with or without sidewalls or drops, constructed of fabric or pliable material supported by a central pole or poles (see "Tent").

[BS] UNDERLAYMENT. One or more layers of a material that is applied to a steep-slope *roof covering* deck under the roof covering and resists liquid water that penetrates the roof covering.

UNIT SKYLIGHT. See "Skylight, unit."

UNSAFE. Structurally unsound, provided with inadequate egress, constituting a fire hazard, or otherwise dangerous to human life, or constituting a hazard to safety, health or public welfare.

[F] UNSTABLE (REACTIVE) MATERIAL. A material, other than an explosive, which in the pure state or as commercially produced, will vigorously polymerize, decompose, condense or become self-reactive and undergo other violent chemical changes, including *explosion*, when exposed to heat, friction or shock, or in the absence of an inhibitor, or in the presence of contaminants, or in contact with *incompatible materials*. Unstable (reactive) materials are subdivided as follows:

Class 4. Materials that in themselves are readily capable of *detonation* or explosive decomposition or explosive reaction at *normal temperatures and pressures*. This class includes materials that are sensitive to mechanical or localized thermal shock at *normal temperatures and pressures.*

Class 3. Materials that in themselves are capable of *detonation* or of explosive decomposition or explosive reaction but which require a strong initiating source or which must be heated under confinement before initiation. This class includes materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures.

Class 2. Materials that in themselves are normally unstable and readily undergo violent chemical change but do not detonate. This class includes materials that can undergo chemical change with rapid release of energy at *normal temperatures and pressures*, and that can undergo violent chemical change at elevated temperatures and pressures.

Class 1. Materials that in themselves are normally stable but which can become unstable at elevated temperatures and pressure.

[F] USE (MATERIAL). Placing a material into action, including *solids, liquids* and gases.

Interpretation I202U: Use, where otherwise mentioned in this code, is equivalent to character of occupancy and not intended to be construed as the definition of "use" in the *Land Use Code*.

UTILITY TRANSFORMER VAULT. A vault containing transformer equipment owned by Seattle City Light or other electric power utility.

[BF] VAPOR PERMEABLE. The property of having a moisture vapor permeance rating of 5 perms (2.9×10^{-10} kg/Pa × s × m^2) or greater, when tested in accordance with the desiccant method using Procedure A of ASTM E96. A vapor permeable material permits the passage of moisture vapor.

[BF] VAPOR RETARDER CLASS. A measure of a material or assembly's ability to limit the amount of moisture that passes through that material or assembly. Vapor retarder class shall be defined using the desiccant method with Procedure A of ASTM E96 as follows:

Class I: 0.1 perm or less.

Class II: 0.1 < perm ≤ 1.0 perm.

Class III: 1.0 < perm ≤ 10 perm.

[BS] VEGETATIVE ROOF. An assembly of interacting components designed to waterproof a building's top surface that includes, by design, vegetation and related landscape elements.

[BS] VEHICLE BARRIER. A component or a system of components, near open sides or walls of garage floors or ramps that act as a restraint for vehicles.

[BG] VEHICULAR GATE. A gate that is intended for use at a vehicular entrance or exit to a facility, building or portion thereof, and that is not intended for use by pedestrian traffic.

[BF] VENEER. A facing attached to a wall for the purpose of providing ornamentation, protection or insulation, but not counted as adding strength to the wall.

[M] VENTILATION. The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, any space.

[BF] VINYL SIDING. A shaped material, made principally from rigid polyvinyl chloride (PVC), that is used as an *exterior wall covering*.

[F] VISIBLE ALARM NOTIFICATION APPLIANCE. A notification appliance that alerts by the sense of sight.

[BG] WALKWAY, PEDESTRIAN. A walkway used exclusively as a pedestrian trafficway.

[BS] WALL (for Chapter 21). A vertical element with a horizontal length-to-thickness ratio greater than three, used to enclose space.

Cavity wall. A wall built of *masonry units* or of concrete, or a combination of these materials, arranged to provide an airspace within the wall, and in which the inner and outer parts of the wall are tied together with metal ties.

Dry-stacked, surface-bonded wall. A wall built of concrete *masonry units* where the units are stacked dry, without *mortar* on the bed or *head joints*, and where both sides of the wall are coated with a surface-bonding *mortar*.

Parapet wall. The part of any wall entirely above the roof line.

[W][BS] WALL, LOAD-BEARING. Any wall meeting either of the following classifications:

1. Any metal or wood stud wall that supports more than 100 pounds per linear foot (1459 N/m) of vertical load in addition to its own weight.
2. Any *masonry* or concrete wall, or mass timber wall that supports more than 200 pounds per linear foot (2919 N/m) of vertical load in addition to its own weight.

[BS] WALL, NONLOAD-BEARING. Any wall that is not a *load-bearing wall*.

[F] WATER-REACTIVE MATERIAL. A material that explodes; violently reacts; produces *flammable*, *toxic* or other hazardous gases; or evolves enough heat to cause autoignition or ignition of combustibles upon exposure to water or moisture. Water-reactive materials are subdivided as follows:

Class 3. Materials that react explosively with water without requiring heat or confinement.

Class 2. Materials that react violently with water or have the ability to boil water. Materials that produce *flammable*, *toxic* or other hazardous gases or evolve enough heat to cause autoignition or ignition of combustibles upon exposure to water or moisture.

Class 1. Materials that react with water with some release of energy, but not violently.

[BF] WATER-RESISTIVE BARRIER. A material behind an *exterior wall covering* that is intended to resist liquid water that has penetrated behind the exterior covering from further intruding into the *exterior wall* assembly.

[BF] WEATHER-EXPOSED SURFACES. Surfaces of walls, ceilings, floors, roofs, soffits and similar surfaces exposed to the weather except the following:

1. Ceilings and roof soffits enclosed by walls, fascia, bulkheads or beams that extend not less than 12 inches (305 mm) below such ceiling or roof soffits.
2. Walls or portions of walls beneath an unenclosed roof area, where located a horizontal distance from an open exterior opening equal to not less than twice the height of the opening.
3. Ceiling and roof soffits located a minimum horizontal distance of 10 feet (3048 mm) from the outer edges of the ceiling or roof soffits.

[F] WET-CHEMICAL EXTINGUISHING SYSTEM. A solution of water and potassium-carbonate-based chemical, potassium-acetate-based chemical or a combination thereof, forming an extinguishing agent.

WHARF. A structure or bulkhead constructed of wood, stone, concrete or similar material built at the shore of a harbor, lake or river for vessels to lie alongside of, and to anchor *piers* or floats.

[BE] WHEELCHAIR SPACE. A space for a single wheelchair and its occupant.

[BS] WINDBORNE DEBRIS REGION. Areas within hurricane-prone regions located:

1. Within 1 mile (1.61 km) of the coastal mean high-water line where the basic design wind speed, *V*, is 130 mph (58 m/s) or greater; or
2. In areas where the basic design wind speed is 140 mph (63.6 m/s) or greater.

For *Risk Category* II buildings and structures and *Risk Category* III buildings and structures, except health care facilities, the windborne debris region shall be based on Figure 1609.3.(1). For *Risk Category* IV buildings and structures and *Risk Category* III health care facilities, the windborne debris region shall be based on Figure 1609.3(2).

WINDFORCE-RESISTING SYSTEM, MAIN. See "Main windforce-resisting system."

[BS] WIND SPEED, *V*. Basic design wind speeds.

[BS] WIND SPEED, V_{asd}. Allowable stress design wind speeds.

[BE] WINDER. A tread with nonparallel edges.

[BS] WIRE BACKING. Horizontal strands of tautened wire attached to surfaces of vertical supports which, when covered with the building paper, provide a *backing* for cement plaster.

[F] WIRELESS PROTECTION SYSTEM. A system or a part of a system that can transmit and receive signals without the aid of wire.

[BS] WOOD/PLASTIC COMPOSITE. A composite material made primarily from wood or cellulose-based materials and plastic.

[BS] WOOD SHEAR PANEL. A wood floor, roof or wall component sheathed to act as a *shear wall* or *diaphragm*.

[BS] WOOD STRUCTURAL PANEL. A panel manufactured from *veneers*, wood strands or wafers or a combination of *veneer* and wood strands or wafers bonded together with waterproof synthetic resins or other suitable bonding systems. Examples of wood structural panels are:

Composite panels. A wood structural panel that is comprised of wood *veneer* and reconstituted wood-based material and bonded together with waterproof adhesive.

Oriented strand board (OSB). A mat-formed wood structural panel comprised of thin rectangular wood strands arranged in cross-aligned layers with surface layers normally arranged in the long panel direction and bonded with waterproof adhesive.

303.1.2 Small assembly spaces. The following rooms and spaces shall not be classified as Assembly occupancies:

1. A room or space used for assembly purposes with an *occupant load* of less than 50 persons and accessory to another occupancy shall be classified as a Group B occupancy or as part of that occupancy.
2. A room or space used for assembly purposes that is less than 750 square feet (70 m^2) in area and accessory to another occupancy shall be classified as a Group B occupancy or as part of that occupancy.

303.1.3 Associated with Group E occupancies. A room or space used for assembly purposes that is associated with a Group E occupancy is not considered a separate occupancy.

303.1.4 Accessory to places of religious worship. Accessory religious educational rooms and religious auditoriums with *occupant loads* of less than 100 per room or space are not considered separate occupancies.

303.2 Assembly Group A-1. Group A-1 occupancy includes assembly uses, usually with fixed seating, intended for the production and viewing of the performing arts or motion pictures including, but not limited to:

Motion picture theaters
Symphony and concert halls
Television and radio studios admitting an audience
Theaters

303.3 Assembly Group A-2. Group A-2 occupancy includes assembly uses intended for food and/or drink consumption including, but not limited to:

Banquet halls
Casinos (gaming areas)
Nightclubs
Restaurants, cafeterias and similar dining facilities
(including associated commercial kitchens)
Taverns and bars

[W] 303.4 Assembly Group A-3. Group A-3 occupancy includes assembly uses intended for worship, recreation or amusement and other assembly uses not classified elsewhere in Group A including, but not limited to:

Amusement arcades
Art galleries <u>more than 3,000 gross square feet</u>
Bowling alleys
Community halls
Courtrooms
Dance halls (not including food or drink consumption)
Exhibition halls
Funeral parlors
Greenhouses for the conservation and exhibition of plants that provide public access.
Gymnasiums (without spectator seating)
Indoor *swimming pools* (without spectator seating)
Indoor tennis courts (without spectator seating)
Lecture halls
Libraries
Museums
Places of religious worship
Pool and billiard parlors
Waiting areas in transportation terminals

303.5 Assembly Group A-4. Group A-4 occupancy includes assembly uses intended for viewing of indoor sporting events and activities with spectator seating including, but not limited to:

Arenas
Skating rinks
Swimming pools
Tennis courts

303.6 Assembly Group A-5. Group A-5 occupancy includes assembly uses intended for participation in or viewing outdoor activities including, but not limited to:

Amusement park structures
Bleachers
Grandstands
Stadiums

SECTION 304
BUSINESS GROUP B

[W] 304.1 Business Group B. Business Group B occupancy includes, among others, the use of a building or structure, or a portion thereof, for office, professional or service-type transactions, including storage of records and accounts. Business occupancies shall include, but not be limited to, the following:

Airport traffic control towers
Ambulatory care facilities
Animal hospitals, kennels and pounds
Banks
Barber and beauty shops
Car wash
Civic administration
Clinic, outpatient
Dry cleaning and laundries: pick-up and delivery stations and self-service
Educational occupancies for students above the 12th grade
Electronic data processing
Food processing establishments and commercial kitchens not associated with restaurants, cafeterias and similar dining facilities, and not more than 2,500 square feet (232 m^2) in area.
Laboratories: testing and research
Motor vehicle showrooms
Post offices
Print shops
Professional services (architects, attorneys, dentists, physicians, engineers, etc.)
Radio and television stations
Telephone exchanges
Training and skill development not in a school or academic program (this shall include, but not be limited to, tutoring centers, martial arts studios, gymnastics and similar uses regardless of the ages served, and where not classified as a Group A occupancy).

SECTION 305
EDUCATIONAL GROUP E

305.1 Educational Group E. Educational Group E occupancy includes, among others, the use of a building or structure, or a portion thereof, by six or more persons at any one time for educational purposes through the 12th grade.

305.1.1 Accessory to places of religious worship. Religious educational rooms and religious auditoriums, which are accessory to *places of religious worship* in accordance with Section 303.1.4 and have *occupant loads* of less than 100 per room or space, shall be classified as Group A-3 occupancies.

305.2 Group E, day care facilities. This group includes buildings and structures or portions thereof occupied by more than five children older than 2 1/2 years of age who receive educational, supervision or *personal care services* for fewer than 24 hours per day.

305.2.1 Within places of religious worship. Rooms and spaces within *places of religious worship* providing such day care during religious functions shall be classified as part of the primary occupancy.

305.2.2 Five or fewer children. A facility having five or fewer children receiving such day care shall be classified as part of the primary occupancy.

305.2.3 Five or fewer children in a dwelling unit. A facility such as the above within a *dwelling unit* and having five or fewer children receiving such day care shall be classified as a Group R-3 occupancy or shall comply with the *International Residential Code*.

[W] 305.2.4 Family home child care. *Family home child care* licensed by Washington State for the care of twelve or fewer children shall be classified as Group R-3 or shall comply with the *International Residential Code.*

SECTION 306
FACTORY GROUP F

306.1 Factory Industrial Group F. Factory Industrial Group F occupancy includes, among others, the use of a building or structure, or a portion thereof, for assembling, disassembling, fabricating, finishing, manufacturing, packaging, repair or processing operations that are not classified as a Group H hazardous or Group S storage occupancy.

[W] 306.2 Moderate-hazard factory industrial, Group F-1. Factory industrial uses that are not classified as Factory Industrial F-2 Low Hazard shall be classified as F-1 Moderate Hazard and shall include, but not be limited to, the following:

Aircraft (manufacturing, not to include repair)
Appliances
Athletic equipment
Automobiles and other motor vehicles
Bakeries
Beverages: over 16-percent alcohol content
Bicycles
Boats
Brooms or brushes
Business machines
Cameras and photo equipment
Canvas or similar fabric
Carpets and rugs (includes cleaning)
Clothing
Construction and agricultural machinery
Disinfectants
Dry cleaning and dyeing
Electric generation plants
Electronics
Engines (including rebuilding)
Food processing establishments and commercial kitchens not associated with restaurants, cafeterias and similar dining facilities, and more than 2,500 square feet (232 m^2) in area.
Furniture
Hemp products
Jute products
Laundries
Leather products
Machinery
Marijuana processing
Metals
Millwork (sash and door)
Motion pictures and television filming (without spectators)
Musical instruments
Optical goods
Paper mills or products
Photographic film
Plastic products
Printing or publishing
Recreational vehicles
Refuse incineration
Shoes
Soaps and detergents
Textiles
Tobacco
Trailers
Upholstering
Wood; distillation
Woodworking (cabinet)

306.3 Low-hazard factory industrial, Group F-2. Factory industrial uses that involve the fabrication or manufacturing of non-combustible materials that during finishing, packing or processing do not involve a significant fire hazard shall be classified as F-2 occupancies and shall include, but not be limited to, the following:

Beverages: up to and including 16-percent alcohol content
Brick and masonry
Ceramic products
Foundries
Glass products
Gypsum

Unstable (reactive) materials, Class 2
Water-reactive materials, Class 2

[F] 307.6 High-hazard Group H-4. Buildings and structures containing materials that are health hazards shall be classified as Group H-4. Such materials shall include, but not be limited to, the following:

Corrosives
Highly toxic materials
Toxic materials

[F] 307.7 High-hazard Group H-5. Semiconductor fabrication facilities and comparable research and development areas in which hazardous production materials (HPM) are used and the aggregate quantity of materials is in excess of those listed in Tables 307.1(1) and 307.1(2) shall be classified as Group H-5. Such facilities and areas shall be designed and constructed in accordance with Section 415.11.

[F] 307.8 Multiple hazards. Buildings and structures containing a material or materials representing hazards that are classified in one or more of Groups H-1, H-2, H-3 and H-4 shall conform to the code requirements for each of the occupancies so classified.

SECTION 308
INSTITUTIONAL GROUP I

308.1 Institutional Group I. Institutional Group I occupancy includes, among others, the use of a building or structure, or a portion thereof, in which care or supervision is provided to persons who are or are not capable of self-preservation without physical assistance or in which persons are detained for penal or correctional purposes or in which the liberty of the occupants is restricted. Institutional occupancies shall be classified as Group I-1, I-2, I-3 or I-4.

[W] 308.2 Institutional Group I-1. Institutional Group I-1 occupancy shall include buildings, structures or portions thereof for more than 16 persons, excluding staff, who reside on a 24-hour basis in a supervised environment and receive custodial care. Buildings of Group I-1 shall be classified as one of the occupancy conditions specified in Section 308.2.1 or 308.2.2. This group shall include, but not be limited to, the following:

Alcohol and drug centers
Assisted living facilities as licensed by Washington state under chapter 388-78A WAC
Congregate care facilities
Group homes
Halfway houses
Residential board and care facilities
Residential treatment facilities as licensed by Washington state under chapter 246-337 WAC
Social rehabilitation facilities

308.2.1 Condition 1. This occupancy condition shall include buildings in which all persons receiving custodial care who, without any assistance, are capable of responding to an emergency situation to complete building evacuation.

308.2.2 Condition 2. This occupancy condition shall include buildings in which there are any persons receiving custodial care who require limited verbal or physical assistance while responding to an emergency situation to complete building evacuation.

[S] ((~~308.2.3 Six to 16 persons receiving custodial care.~~ ~~A facility housing not fewer than six and not more than 16 persons receiving custodial care shall be classified as Group R-4.~~))

((~~308.2.4~~)) 308.2.3 Five or fewer persons receiving custodial care. A facility with five or fewer persons receiving custodial care shall be classified as Group R-3 or shall comply with the *International Residential Code* provided an *automatic sprinkler system* is installed in accordance with Section 903.3.1.3 or Section P2904 of the *International Residential Code*.

[W] 308.2.4 Adult family homes. *Adult family homes* licensed by Washington state shall be classified as Group R-3 or shall comply with the International Residential Code.

[W] 308.2.5 Licensed care facilities. Assisted living facilities as licensed by Washington State under chapter 388-78A WAC shall be classified as Group I-1, Condition 2.

Residential treatment facilities licensed by Washington State under chapter 246-337 WAC shall be classified as one or more occupancy types in accordance with chapter 246-337 WAC.

[W] 308.3 Institutional Group I-2. Institutional Group I-2 occupancy shall include buildings and structures used for *medical care* on a 24-hour basis for more than five persons who are *incapable of self-preservation*. This group shall include, but not be limited to, the following:

Foster care facilities
Detoxification facilities

Hospice care centers
Hospitals
Nursing homes
Psychiatric hospitals

308.3.1 Occupancy conditions. Buildings of Group I-2 shall be classified as one of the occupancy conditions specified in Section 308.3.1.1 or 308.3.1.2.

308.3.1.1 Condition 1. This occupancy condition shall include facilities that provide nursing and medical care but do not provide emergency care, surgery, obstetrics or in-patient stabilization units for psychiatric or detoxification, including but not limited to nursing homes and foster care facilities.

308.3.1.2 Condition 2. This occupancy condition shall include facilities that provide nursing and medical care and could provide emergency care, surgery, obstetrics or in-patient stabilization units for psychiatric or detoxification, including but not limited to hospitals.

308.3.2 Five or fewer persons receiving medical care. A facility with five or fewer persons receiving medical care shall be classified as Group R-3 or shall comply with the *International Residential Code* provided an *automatic sprinkler system* is installed in accordance with Section 903.3.1.3 or Section P2904 of the *International Residential Code*.

308.4 Institutional Group I-3. Institutional Group I-3 occupancy shall include buildings and structures that are inhabited by more than five persons who are under restraint or security. A Group I-3 facility is occupied by persons who are generally *incapable of self-preservation* due to security measures not under the occupants' control. This group shall include, but not be limited to, the following:

Correctional centers
Detention centers
Jails
Prerelease centers
Prisons
Reformatories

Buildings of Group I-3 shall be classified as one of the occupancy conditions specified in Sections 308.4.1 through 308.4.5 (see Section 408.1).

308.4.1 Condition 1. This occupancy condition shall include buildings in which free movement is allowed from sleeping areas, and other spaces where access or occupancy is permitted, to the exterior via *means of egress* without restraint. A Condition 1 facility is permitted to be constructed as Group R.

308.4.2 Condition 2. This occupancy condition shall include buildings in which free movement is allowed from sleeping areas and any other occupied *smoke compartment* to one or more other *smoke compartments*. Egress to the exterior is impeded by locked *exits*.

308.4.3 Condition 3. This occupancy condition shall include buildings in which free movement is allowed within individual *smoke compartments*, such as within a residential unit comprised of individual *sleeping units* and group activity spaces, where egress is impeded by remote-controlled release of *means of egress* from such a *smoke compartment* to another *smoke compartment*.

308.4.4 Condition 4. This occupancy condition shall include buildings in which free movement is restricted from an occupied space. Remote-controlled release is provided to permit movement from *sleeping units*, activity spaces and other occupied areas within the *smoke compartment* to other *smoke compartments*.

308.4.5 Condition 5. This occupancy condition shall include buildings in which free movement is restricted from an occupied space. Staff-controlled manual release is provided to permit movement from *sleeping units*, activity spaces and other occupied areas within the *smoke compartment* to other *smoke compartments*.

308.5 Institutional Group I-4, day care facilities. Institutional Group I-4 occupancy shall include buildings and structures occupied by more than five persons of any age who receive *custodial care* for fewer than 24 hours per day by persons other than parents or guardians, relatives by blood, marriage or adoption, and in a place other than the home of the person cared for. This group shall include, but not be limited to, the following:

Adult day care
Child day care

308.5.1 Classification as Group E. A child day care facility that provides care for more than five but not more than 100 children 2 1/2 years or less of age, where the rooms in which the children are cared for are located on a *level of exit discharge* serving such rooms and each of these child care rooms has an *exit* door directly to the exterior, shall be classified as Group E.

308.5.2 Within a place of religious worship. Rooms and spaces within *places of religious worship* providing such care during religious functions shall be classified as part of the primary occupancy.

308.5.3 Five or fewer persons receiving care. A facility having five or fewer persons receiving *custodial care* shall be classified as part of the primary occupancy.

308.5.4 Five or fewer persons receiving care in a dwelling unit. A facility such as the above within a *dwelling unit* and having five or fewer persons receiving *custodial care* shall be classified as a Group R-3 occupancy or shall comply with the *International Residential Code.*

[W] 308.5.5 Family home child care. *Family home child care* licensed by Washington state for the care of 12 or fewer children shall be classified as Group R-3 or shall comply with the *International Residential Code*.

SECTION 309
MERCANTILE GROUP M

[W] 309.1 Mercantile Group M. Mercantile Group M occupancy includes, among others, the use of a building or structure or a portion thereof for the display and sale of merchandise, and involves stocks of goods, wares or merchandise incidental to such purposes and accessible to the public. Mercantile occupancies shall include, but not be limited to, the following:

Art galleries, 3,000 gross square feet or less
Department stores
Drug stores
Markets
Greenhouses for display and sale of plants that provide public access.
Motor fuel-dispensing facilities
Retail or wholesale stores
Sales rooms

309.2 Quantity of hazardous materials. The aggregate quantity of nonflammable solid and nonflammable or noncombustible liquid hazardous materials stored or displayed in a single *control area* of a Group M occupancy shall not exceed the quantities in Table 414.2.5(1).

SECTION 310
RESIDENTIAL GROUP R

310.1 Residential Group R. Residential Group R includes, among others, the use of a building or structure, or a portion thereof, for sleeping purposes when not classified as an Institutional Group I or when not regulated by the *International Residential Code*.

310.2 Residential Group R-1. Residential Group R-1 occupancies containing *sleeping units* where the occupants are primarily *transient* in nature, including:

Boarding houses (*transient*) with more than 10 occupants
Congregate living facilities (*transient)* with more than 10 occupants
Hotels (*transient*)
Motels (*transient*)

[W] 310.3 Residential Group R-2. Residential Group R-2 occupancies containing *sleeping units* or more than two *dwelling units* where the occupants are primarily permanent in nature, including:

Apartment houses
Assisted living facilities licensed by Washington state under Chapter 388-78A WAC
Congregate living facilities (nontransient) with more than 16 occupants
- *Boarding houses (nontransient)*
- Convents
- *Dormitories*
- Fraternities and sororities
- Monasteries

Hotels (nontransient)
((~~*Live/work*~~)) Buildings that contain three or more *live/work units*
Motels (nontransient)
Residential treatment facilities licensed by Washington State under Chapter 246-337 WAC
Vacation timeshare properties

[S] 310.4 Residential Group R-3. Residential Group R-3 occupancies where the occupants are primarily permanent in nature and not classified as Group R-1, R-2, R-4 or I, including:

Buildings that do not contain more than two *dwelling units*
Buildings that do not contain more than two live/work units
Care facilities that provide accommodations for five or fewer persons receiving care
Congregate living facilities (nontransient) with 16 or fewer occupants

Boarding houses (nontransient)
Convents
Dormitories
Fraternities and sororities
Monasteries

Congregate living facilities (*transient*) with 10 or fewer occupants

Boarding houses (transient)

Lodging houses (*transient*) with five or fewer *guest rooms* and 10 or fewer occupants

310.4.1 Care facilities within a dwelling. Care facilities for five or fewer persons receiving care that are within a single-family dwelling are permitted to comply with the *International Residential Code* provided an *automatic sprinkler system* is installed in accordance with Section 903.3.1.3 or Section P2904 of the *International Residential Code*.

310.4.2 Lodging houses. Owner-occupied *lodging houses* with five or fewer *guest rooms* and 10 or fewer total occupants shall be permitted to be constructed in accordance with the *International Residential Code*.

[W] 310.4.3 Adult family homes, family home child care. *Adult family homes* and *family home child care* facilities that are within a single-family home are permitted to comply with the *International Residential Code*.

[W] 310.4.4 Foster family care homes. Foster family care homes licensed by Washington state are permitted to comply with the International Residential Code, as an accessory use to a *dwelling*, for six or fewer children including those of the resident family.

[S] ((~~310.5 Residential Group R-4.~~ ~~Residential Group R-4 occupancy shall include buildings, structures or portions thereof for more than five but not more than 16 persons, excluding staff, who reside on a 24-hour basis in a supervised residential environment and receive *custodial care*. Buildings of Group R-4 shall be classified as one of the occupancy conditions specified in Section 310.5.1 or 310.5.2. This group shall include, but not be limited to, the following:~~

~~Alcohol and drug centers~~
~~Assisted living facilities~~
~~Congregate care facilities~~
~~*Group homes*~~
~~Halfway houses~~
~~Residential board and care facilities~~
~~Social rehabilitation facilities~~

~~Group R-4 occupancies shall meet the requirements for construction as defined for Group R-3, except as otherwise provided for in this code.~~

~~**310.5.1 Condition 1.** This occupancy condition shall include buildings in which all persons receiving custodial care, without any assistance, are capable of responding to an emergency situation to complete building evacuation.~~

~~**310.5.2 Condition 2.** This occupancy condition shall include buildings in which there are any persons receiving custodial care who require limited verbal or physical assistance while responding to an emergency situation to complete building evacuation.~~))

SECTION 311
STORAGE GROUP S

311.1 Storage Group S. Storage Group S occupancy includes, among others, the use of a building or structure, or a portion thereof, for storage that is not classified as a hazardous occupancy.

311.1.1 Accessory storage spaces. A room or space used for storage purposes that is accessory to another occupancy shall be classified as part of that occupancy.

[S] 311.2 Moderate-hazard storage, Group S-1. Storage Group S-1 occupancies are buildings occupied for storage uses that are not classified as Group S-2, including, but not limited to, storage of the following:

Aerosol products, Levels 2 and 3
Aircraft hangar (storage and repair)
Bags: cloth, burlap and paper
Bamboos and rattan
Baskets
Belting: canvas and leather
Books and paper in rolls or packs
Boots and shoes
Buttons, including cloth covered, pearl or bone
Cardboard and cardboard boxes
Clothing, woolen wearing apparel

Cordage
Dry boat storage (indoor)
Furniture
Furs
Glues, mucilage, pastes and size
Grains
Horns and combs, other than celluloid
Leather
Linoleum
Lumber
Motor vehicle and marine repair garages complying with the maximum allowable quantities of hazardous materials listed in Table 307.1(1) (see Section 406.8)
Photo engravings
Resilient flooring
Self-service storage facility (mini-storage)
Silks
Soaps
Sugar
Tires, bulk storage of
Tobacco, cigars, cigarettes and snuff
Upholstery and mattresses
Wax candles

[S] 311.3 Low-hazard storage, Group S-2. Storage Group S-2 occupancies include, among others, buildings used for the storage of noncombustible materials such as products on wood pallets or in paper cartons with or without single thickness divisions; or in paper wrappings. Such products are permitted to have a negligible amount of plastic *trim*, such as knobs, handles or film wrapping. Group S-2 storage uses shall include, but not be limited to, storage of the following:

Asbestos
Beverages up to and including 16-percent alcohol in metal, glass or ceramic containers
Cement in bags
Chalk and crayons
Covered boat moorage not classified as Group U
Dairy products in nonwaxed coated paper containers
Dry cell batteries
Electrical coils
Electrical motors
Empty cans
Food products
Foods in noncombustible containers
Fresh fruits and vegetables in nonplastic trays or containers
Frozen foods
Glass
Glass bottles, empty or filled with noncombustible liquids
Gypsum board
Inert pigments
Ivory
Meats
Metal cabinets
Metal desks with plastic tops and *trim*
Metal parts
Metals
Mirrors
Oil-filled and other types of distribution transformers
Parking garages, open or enclosed
Porcelain and pottery
Stoves
Talc and soapstones
Washers and dryers

SECTION 312
UTILITY AND MISCELLANEOUS GROUP U

[S] 312.1 General. Buildings and structures of an accessory character and miscellaneous structures not classified in any specific occupancy shall be constructed, equipped and maintained to conform to the requirements of this code commensurate with the fire and life hazard incidental to their occupancy. Group U shall include, but not be limited to, the following:

Agricultural buildings
Aircraft hangars, accessory to a one- or two-family residence (see Section 412.4)
Barns
Carports
Communication equipment structures with a *gross floor area* of less than 1,500 square feet (139 m^2)
Covered boat moorage accessory to Group R-3 *dwelling unit*
Fences more than 6 feet (1829 mm) in height
Grain silos, accessory to a residential occupancy
Livestock shelters
Private garages that comply with Section 406.3
Retaining walls
Sheds
Stables
Tanks
Towers

312.1.1 Greenhouses. Greenhouses not classified as another occupancy shall be classified as Use Group U.

CHAPTER 4

SPECIAL DETAILED REQUIREMENTS BASED ON OCCUPANCY AND USE

User note:

About this chapter: *Chapter 4 provides detailed criteria for special uses and occupancies. The unique characteristics of a live/work unit as opposed to a 30-story high-rise building call for specific standards for each. Twenty-seven sections address covered and open mall buildings, atriums, hospitals, stages, buildings where hazardous materials are used and stored, jails and prisons, ambulatory care facilities and storm shelters, among other special occupancy issues.*

SECTION 401
SCOPE

401.1 Detailed occupancy and use requirements. In addition to the occupancy and construction requirements in this code, the provisions of this chapter apply to the occupancies and use described herein.

SECTION 402
COVERED MALL AND OPEN MALL BUILDINGS

402.1 Applicability. The provisions of this section shall apply to buildings or structures defined herein as *covered or open mall buildings* not exceeding three floor levels at any point nor more than three *stories above grade plane*. Except as specifically required by this section, *covered and open mall buildings* shall meet applicable provisions of this code.

Exceptions:

1. Foyers and lobbies of Groups B, R-1 and R-2 are not required to comply with this section.
2. Buildings need not comply with the provisions of this section where they totally comply with other applicable provisions of this code.

402.1.1 Open mall building perimeter line. For the purpose of this code, a perimeter line shall be established. The perimeter line shall encircle all buildings and structures that comprise the *open mall building* and shall encompass any open-air interior walkways, open-air courtyards or similar open-air spaces. The perimeter line shall define the extent of the *open mall building*. *Anchor buildings* and parking structures shall be outside of the perimeter line and are not considered as part of the *open mall building*.

402.2 Open space. A *covered mall building* and attached *anchor buildings* and parking garages shall be surrounded on all sides by a permanent open space or not less than 60 feet (18 288 mm). An *open mall building* and *anchor buildings* and parking garages adjoining the perimeter line shall be surrounded on all sides by a permanent open space of not less than 60 feet (18 288 mm).

Exception: The permanent open space of 60 feet (18 288 mm) shall be permitted to be reduced to not less than 40 feet (12 192 mm), provided that the following requirements are met:

1. The reduced open space shall not be allowed for more than 75 percent of the perimeter of the *covered or open mall building* and *anchor buildings*.
2. The *exterior wall* facing the reduced open space shall have a *fire-resistance rating* of not less than 3 hours.
3. Openings in the *exterior wall* facing the reduced open space shall have opening protectives with a *fire protection rating* of not less than 3 hours.
4. Group E, H, I or R occupancies are not located within the *covered or open mall building* or *anchor buildings*.

[S] ((~~402.3 Lease plan.~~ ~~Each *owner* of a *covered mall building* or of an *open mall building* shall provide both the building and fire departments with a lease plan showing the location of each occupancy and its *exits* after the certificate of occupancy has been issued. Modifications or changes in occupancy or use from that shown on the lease plan shall not be made without prior approval of the *building official*.~~))

402.4 Construction. The construction of *covered and open mall buildings*, *anchor buildings* and parking garages associated with a *mall* building shall comply with Sections 402.4.1 through 402.4.3.

402.4.1 Area and types of construction. The *building area* and type of construction of *covered mall* or *open mall buildings*, *anchor buildings* and parking garages shall comply with this section.

[S][F] 402.7.3 Emergency power system. *Covered mall buildings* greater than 50,000 square feet (4645 m^2) in area and *open mall buildings* greater than 50,000 square feet (4645 m^2) within the established perimeter line shall be provided with emergency power *systems* that is capable of operating the *emergency voice/alarm communication system* in accordance with Section 2702.

[F] 402.7.4 Emergency voice/alarm communication system. Where the total floor area is greater than 50,000 square feet (4645 m^2) within either a *covered mall building* or within the perimeter line of an *open mall building*, an *emergency voice/alarm communication system* shall be provided.

The fire department shall have access to any *emergency voice/alarm communication systems* serving a *mall*, required or otherwise. The systems shall be provided in accordance with Section 907.5.2.2.

[F] 402.7.5 Fire department access to equipment. Rooms or areas containing controls for air-conditioning systems, *automatic fire-extinguishing systems, automatic sprinkler systems* or other detection, suppression or control elements shall be identified for use by the fire department.

402.8 Means of egress. *Covered mall buildings, open mall buildings* and each tenant space within a mall building shall be provided with *means of egress* as required by this section and this code. Where there is a conflict between the requirements of this code and the requirements of Sections 402.8.1 through 402.8.8, the requirements of Sections 402.8.1 through 402.8.8 shall apply.

402.8.1 Mall width. For the purpose of providing required egress, *malls* are permitted to be considered as *corridors* but need not comply with the requirements of Section 1005.1 of this code where the width of the *mall* is as specified in this section.

402.8.1.1 Minimum width. The aggregate clear egress width of the *mall* in either a *covered or open mall building* shall be not less than 20 feet (6096 mm). The *mall* width shall be sufficient to accommodate the *occupant load* served. Any portion of the minimum required aggregate egress width shall be not less than 10 feet (3048 mm) measured to a height of 8 feet (2438 mm) between any projection of a tenant space bordering the *mall* and the nearest kiosk, vending machine, bench, display opening, *food court* or other obstruction to *means of egress* travel.

402.8.2 Determination of occupant load. The *occupant load* permitted in any individual tenant space in a *covered or open mall building* shall be determined as required by this code. *Means of egress* requirements for individual tenant spaces shall be based on the *occupant load* thus determined.

402.8.2.1 Occupant formula. In determining required *means of egress* of the *mall*, the number of occupants for whom *means of egress* are to be provided shall be based on *gross leasable area* of the *covered or open mall building* (excluding *anchor buildings*) and the *occupant load* factor as determined by Equation 4-1.

$$OLF = (0.00007)(GLA) + 25 \qquad \textbf{(Equation 4-1)}$$

where:

OLF = The *occupant load* factor (square feet per person).

GLA = The *gross leasable area* (square feet).

Exception: Tenant spaces attached to a *covered or open mall building* but with a *means of egress* system that is totally independent of the *open mall* of an *open mall building* or of a *covered mall building* shall not be considered as *gross leasable area* for determining the required *means of egress* for the *mall building*.

402.8.2.2 OLF range. The *occupant load* factor (*OLF*) is not required to be less than 30 and shall not exceed 50.

402.8.2.3 Anchor buildings. The *occupant load* of *anchor buildings* opening into the *mall* shall not be included in computing the total number of occupants for the *mall*.

402.8.2.4 Food courts. The *occupant load* of a *food court* shall be determined in accordance with Section 1004. For the purposes of determining the *means of egress* requirements for the *mall*, the *food court occupant load* shall be added to the *occupant load* of the *covered or open mall building* as calculated in Section 402.8.2.1.

402.8.3 Number of means of egress. Wherever the distance of travel to the *mall* from any location within a tenant space used by persons other than employees is greater than 75 feet (22 860 mm) or the tenant space has an *occupant load* of 50 or more, not fewer than two *means of egress* shall be provided.

402.8.4 Arrangements of means of egress. Assembly occupancies with an *occupant load* of 500 or more located within a *covered mall building* shall be so located such that their entrance will be immediately adjacent to a principal entrance to the *mall* and shall have not less than one-half of their required *means of egress* opening directly to the exterior of the *covered mall building*. Assembly occupancies located within the perimeter line of an *open mall building* shall be permitted to have their main *exit* open to the *open mall*.

402.8.4.1 Anchor building means of egress. Required *means of egress* for *anchor buildings* shall be provided independently from the *mall means of egress* system. The *occupant load* of *anchor buildings* opening into the *mall* shall not be included in determining *means of egress* requirements for the *mall*. The path of egress travel of *malls* shall not exit through

anchor buildings. *Malls* terminating at an *anchor building* where other *means of egress* has not been provided shall be considered as a dead-end *mall*.

402.8.5 Distance to exits. Within each individual tenant space in a *covered or open mall building*, the distance of travel from any point to an *exit* or entrance to the *mall* shall be not greater than 200 feet (60 960 mm).

The distance of travel from any point within a *mall* of a *covered mall building* to an *exit* shall be not greater than 200 feet (60 960 mm). The maximum distance of travel from any point within an *open mall* to the perimeter line of the *open mall building* shall be not greater than 200 feet (60 960 mm).

402.8.6 Access to exits. Where more than one *exit* is required, they shall be so arranged that it is possible to travel in either direction from any point in a *mall* of a *covered mall building* to separate *exits* or from any point in an *open mall* of an *open mall building* to two separate locations on the perimeter line, provided that neither location is an exterior wall of an *anchor building* or parking garage. The width of an *exit passageway* or *corridor* from a *mall* shall be not less than 66 inches (1676 mm).

Exception: Access to exits is permitted by way of a dead-end *mall* that does not exceed a length equal to twice the width of the *mall* measured at the narrowest location within the dead-end portion of the *mall*.

402.8.6.1 Exit passageways. Where *exit passageways* provide a secondary *means of egress* from a tenant space, the *exit passageways* shall be constructed in accordance with Section 1024.

402.8.7 Service areas fronting on exit passageways. Mechanical rooms, electrical rooms, building service areas and service elevators are permitted to open directly into *exit passageways*, provided that the *exit passageway* is separated from such rooms with not less than 1-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. The *fire protection rating* of openings in the *fire barriers* shall be not less than 1 hour.

402.8.8 Security grilles and doors. Horizontal sliding or vertical security grilles or doors that are a part of a required *means of egress* shall conform to the following:

1. Doors and grilles shall remain in the full open position during the period of occupancy by the general public.
2. Doors or grilles shall not be brought to the closed position when there are 10 or more persons occupying spaces served by a single *exit* or 50 or more persons occupying spaces served by more than one *exit*.
3. The doors or grilles shall be openable from within without the use of any special knowledge or effort where the space is occupied.
4. Where two or more *exits* are required, not more than one-half of the *exits* shall be permitted to include either a horizontal sliding or vertical rolling grille or door.

SECTION 403
HIGH-RISE BUILDINGS

Note: High rise projects over 240 feet in structural height or using an alternative lateral force resisting system are subject to peer review, in accordance with Section 1613. Peer reviews require lengthy lead time prior to permit application and issuance. Applicants should contact the *building official* prior to the start of structural design.

[S] 403.1 Applicability. *High-rise buildings* shall comply with Sections 403.2 through ((~~403.6~~)) 403.8.

Exception: The provisions of Sections 403.2 through 403.6 shall not apply to the following buildings and structures:

1. Airport traffic control towers in accordance with Section 412.2.
2. *Open parking garages* in accordance with Section 406.5.
3. The portion of a building containing a Group A-5 occupancy in accordance with Section 303.6.
4. Special industrial occupancies in accordance with Section 503.1.1.

((~~5. Buildings containing any one of the following:~~

~~5.1. A Group H-1 occupancy.~~

~~5.2. A Group H-2 occupancy in accordance with Section 415.8, 415.9.2, 415.9.3 or 426.1.~~

~~5.3. A Group H-3 occupancy in accordance with Section 415.8.~~))

Interpretation I403.1a: Item 2 only includes buildings in which parking is the principal use.

Interpretation I403.1b: For the purpose of this section, occupied roofs are considered floors used for human occupancy if the occupant load of the roof is ten or more on a building not equipped with an *automatic sprinkler system* or where the occupant load is 50 or more on the roof of a building that is equipped with an *automatic sprinkler system*.

403.1.1 Presubmittal conferences. The applicant shall arrange two presubmittal conferences with the design team, the *building official* and the *fire code official* in accordance with Sections 403.1.1.1 and 403.1.1.2.

403.1.1.1 High rise presubmittal conference. The applicant shall arrange a high rise presubmittal conference at least 60 days prior to submittal of a building permit application that contains the construction documents for any structural component of the building. The purpose of this presubmittal conference is to obtain conceptual approval of the design team approach to compliance with key provisions of this code related to high rise construction, excluding smoke control. The documentation of the high rise presubmittal meetings shall be reflected on the plans for the building and become a permanent part of the records of the Department of Construction and Inspections.

403.1.1.2 Smoke control presubmittal conference. The applicant shall arrange a smoke control presubmittal conference in accordance with Section 909.1.1.

[S] 403.2 Construction. The construction of *high-rise buildings* shall comply with the provisions of Sections 403.2.1 through 403.2.4.

403.2.1 Reduction in fire-resistance rating. The *fire-resistance rating* reductions listed in Sections 403.2.1.1 and 403.2.1.2 shall be allowed in buildings that have sprinkler control valves equipped with supervisory initiating devices and water-flow initiating devices for each floor.

403.2.1.1 Type of construction. The following reductions in the minimum *fire-resistance rating* of the building elements in Table 601 shall be permitted as follows:

1. For buildings not greater than 420 feet (128 m) in *building height*, the *fire-resistance rating* of the building elements in Type IA construction shall be permitted to be reduced to the minimum *fire-resistance ratings* for the building elements in Type IB.

   Exception: The required *fire-resistance rating* of ((~~columns supporting floors~~)) structural frame and bearing walls shall not be reduced.

2. In other than Group F-1, H-2, H-3, H-5, M and S-1 occupancies, the *fire-resistance rating* of the building elements in Type IB construction shall be permitted to be reduced to the *fire-resistance ratings* in Type IIA.
3. The *building height* and *building area* limitations of a building containing building elements with reduced *fire-resistance ratings* shall be permitted to be the same as the building without such reductions.

403.2.1.2 Shaft enclosures. For buildings not greater than 420 feet (128 m) in *building height*, the required *fire-resistance rating* of the *fire barriers* enclosing vertical *shafts*, other than *interior exit stairway* and elevator hoistway enclosures, is permitted to be reduced to 1 hour where automatic sprinklers are installed within the *shafts* at the top and at alternate floor levels.

403.2.2 Seismic considerations. For seismic considerations, see Chapter 16.

[S][BS] 403.2.3 Structural integrity of interior exit stairways and elevator hoistway enclosures. For *high-rise buildings* of *Risk Category* III or IV in accordance with Section 1604.5, for fire service access elevators and for all buildings that are more than 420 feet (128 m) in *building height*, enclosures for *interior exit stairways* and elevator hoistway enclosures shall comply with Sections 403.2.3.1 through 403.2.3.4.

[BS] 403.2.3.1 Wall assembly. The wall assemblies making up the enclosures for *interior exit stairways* and elevator hoistway enclosures shall meet or exceed Soft Body Impact Classification Level 2 as measured by the test method described in ASTM C1629/C1629M.

[BS] 403.2.3.2 Wall assembly materials. The face of the wall assemblies making up the enclosures for *interior exit stairways* and elevator hoistway enclosures that are not exposed to the interior of the enclosures for *interior exit stairways* or elevator hoistway enclosure shall be constructed in accordance with one of the following methods:

1. The wall assembly shall incorporate not fewer than two layers of impact-resistant construction board each of which meets or exceeds Hard Body Impact Classification Level 2 as measured by the test method described in ASTM C1629/C1629M.
2. The wall assembly shall incorporate not fewer than one layer of impact-resistant construction material that meets or exceeds Hard Body Impact Classification Level 3 as measured by the test method described in ASTM C1629/C1629M.
3. The wall assembly incorporates multiple layers of any material, tested in tandem, that meets or exceeds Hard Body Impact Classification Level 3 as measured by the test method described in ASTM C1629/C1629M.

[BS] 403.2.3.3 Concrete and masonry walls. Concrete or masonry walls shall be deemed to satisfy the requirements of Sections 403.2.3.1 and 403.2.3.2.

[BS] 403.2.3.4 Other wall assemblies. Any other wall assembly that provides impact resistance equivalent to that required by Sections 403.2.3.1 and 403.2.3.2 for Hard Body Impact Classification Level 3, as measured by the test method described in ASTM C1629/C1629M, shall be permitted.

403.2.4 Sprayed fire-resistant materials (SFRM). The bond strength of the SFRM installed throughout the building shall be in accordance with Table 403.2.4.

TABLE 403.2.4
MINIMUM BOND STRENGTH

HEIGHT OF BUILDING[a]	SFRM MINIMUM BOND STRENGTH
Up to 420 feet	430 psf
Greater than 420 feet	1,000 psf

For SI: 1 foot = 304.8 mm, 1 pound per square foot (psf) = 0.0479 kN/m^2.
a. Above the lowest level of fire department vehicle access.

[S][F] 403.3 Automatic sprinkler system. Buildings and structures shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 and a secondary water supply where required by Section 403.3.3. See Section 903.3.1.1.3 for additional requirements for sprinkler systems in high-rise buildings.

Exception: An *automatic sprinkler system* shall not be required in spaces or areas of ((~~:~~

~~1. *Open parking garages* in accordance with Section 406.5.~~

~~2. Telecommunications~~)) telecommunications equipment buildings used exclusively for telecommunications equipment, associated electrical power distribution equipment, batteries and standby engines, provided that those spaces or areas are equipped throughout with an automatic fire detection system in accordance with Section 907.2 and are separated from the remainder of the building by not less than 1-hour *fire barriers* constructed in accordance with Section 707 or not less than 2-hour *horizontal assemblies* constructed in accordance with Section 711, or both.

[S][F] ((~~403.3.1 Number of sprinkler risers and system design.~~ ~~Each sprinkler system zone in buildings that are more than 420 feet (128 m) in *building height* shall be supplied by not fewer than two risers. Each riser shall supply sprinklers on alternate floors. If more than two risers are provided for a zone, sprinklers on adjacent floors shall not be supplied from the same riser.~~))

[S][F] 403.3.1 Automatic sprinkler system design. High-rise building sprinkler systems shall be combination standpipe/sprinkler systems incorporating the following features:

1. Each floor sprinkler system shall be connected between standpipe risers.
2. Shut-off valves, water-flow devices and check valves (or pressure reducing valves) shall be provided on each floor at the sprinkler system connection to each standpipe.
3. Two four-way fire department connections serving the combination system shall be provided on separate streets well separated from each other.
4. When a mid-level fire pump is required to meet pressure requirements, two pumps with the same rating shall be installed.
5. Dry-pipe sprinkler systems serving parking garages may use a separate two-way fire department connection. The dry-pipe sprinkler system shall be supplied by the on-site water tank.
6. The standpipe risers in each required stair shall be a minimum pipe size of 6 inches (152 mm).
7. Two 2-1/2-inch (64 mm) hose connections shall be provided on every floor level landing in every required stairway. If pressure reducing valves (PRV) are required, each hose connection shall be provided with its own PRV.
8. The system shall be designed to provide a minimum flow of 300 gpm (19 L/s) at a minimum pressure of 150 psi 1034 kPa [maximum 205 psi (1379 kPa)] at each standpipe connection in addition to the flow and pressure requirements contained in NFPA 14.

[F] 403.3.1.1 Riser location. Sprinkler risers shall be placed in *interior exit stairways* and ramps that are remotely located in accordance with Section 1007.1.

[W][S][F] 403.3.2 Water supply to required fire pumps. In Type IV-A and Type IV-B buildings that are more than ((~~420~~)) 120 feet (((~~128~~)) 39 m) in *building height*, required fire pumps shall be supplied by connections to not fewer than two water mains located in different streets. Separate supply piping shall be provided between each connection to the water main and the pumps. Each connection and the supply piping between the connection and the pumps shall be sized to supply the flow and pressure required for the pumps to operate.

Exception: Two connections to the same main shall be permitted provided that the main is valved such that an interruption can be isolated so that the water supply will continue without interruption through not fewer than one of the connections.

[S][F] 403.3.3 Secondary water supply. An automatic secondary on-site water supply having a capacity providing the lesser of a net volume of 33,000 gallons or a volume that is not less than the hydraulically calculated sprinkler demand, including the hose stream requirement, shall be provided for *high-rise buildings* assigned to Seismic Design Category C, D, E or F as determined by Section 1613. An additional fire pump shall not be required for the secondary water supply unless needed to provide the minimum design intake pressure at the suction side of the fire pump supplying the *automatic sprinkler system*. The secondary water supply shall have a duration of not less than 30 minutes.

[F] 403.3.4 Fire pump room. Fire pumps shall be located in rooms protected in accordance with Section 913.2.1.

[S][F] 403.4 Emergency systems. The detection, alarm and emergency systems of *high-rise buildings* shall comply with Sections 403.4.1 through 403.4.8.

[F] 403.4.1 Smoke detection. Smoke detection shall be provided in accordance with Section 907.2.12.1.

[F] 403.4.2 Fire alarm system. A *fire alarm* system shall be provided in accordance with Section 907.2.12.

[F] 403.4.3 Standpipe system. A *high-rise building* shall be equipped with a standpipe system as required by Section 905.3.

[F] 403.4.4 Emergency voice/alarm communication system. An *emergency voice/alarm communication system* shall be provided in accordance with Section 907.5.2.2.

[F] 403.4.5 Emergency responder radio coverage. Emergency responder radio coverage shall be provided in accordance with Section 510 of the *International Fire Code*.

[F] 403.4.6 Fire command. A *fire command center* complying with Section 911 shall be provided in a location *approved* by the fire code official.

[F] 403.4.7 ((~~Smoke removal.~~)) No requirements. ((~~To facilitate smoke removal in post-fire salvage and overhaul operations, buildings and structures shall be equipped with natural or mechanical *ventilation* for removal of products of combustion in accordance with one of the following:~~

~~1. Easily identifiable, manually operable windows or panels shall be distributed around the perimeter of each floor at not more than 50-foot (15 240 mm) intervals. The area of operable windows or panels shall be not less than 40 square feet (3.7 m²) per 50 linear feet (15 240 mm) of perimeter.~~

~~**Exceptions:**~~

~~1. In Group R-1 occupancies, each *sleeping unit* or suite having an *exterior wall* shall be permitted to be provided with 2 square feet (0.19 m²) of venting area in lieu of the area specified in Item 1.~~

~~2. Windows shall be permitted to be fixed provided that glazing can be cleared by fire fighters.~~

~~2. Mechanical air-handling equipment providing one exhaust air change every 15 minutes for the area involved. Return and exhaust air shall be moved directly to the outside without recirculation to other portions of the building.~~

~~3. Any other *approved* design that will produce equivalent results.~~))

[F] 403.4.8 ((~~Standby and emergency~~)) Emergency power. ((~~A standby power system complying with Section 2702 and Section 3003 shall be provided for the standby power loads specified in Section 403.4.8.3.~~)) An emergency power system complying with Section 2702 shall be provided for the emergency power loads specified in Section 403.4.8.4.

[F] 403.4.8.1 Equipment room. If the ((~~standby or~~)) emergency power system includes a generator set inside a building, the system shall be located in a separate room enclosed with 2-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. System supervision with manual start and transfer features shall be provided at the *fire command center*.

Exceptions:

1. In Group I-2, Condition 2, manual start and transfer features for the critical branch of the emergency power are not required to be provided at the *fire command center*.
2. Where located within a sprinklered parking garage of Type I or II construction, emergency power and *legally required standby power systems* with fixed fuel quantities meeting the limits of Section 603.3 of the *International Fire Code*, and their transfer switches, are not required to be in a separate room. Other occupancies located in the *story* where the system is located shall be separated from the system by fire barriers with a minimum 1 hour fire-resistance rating.
3. Combustion and radiator intake air are permitted to be transferred from the adjacent garage. Radiator discharge air is permitted to be transferred to the adjacent garage. Radiator ventilation intake and discharge air locations shall be separated to maintain the radiator ventilation intake air temperature below the maximum temperature allowed to meet the emergency and *legally required standby power system* loads.

[F] 403.4.8.2 Fuel line piping protection. Fuel lines supplying a generator set inside a building shall be separated from areas of the building other than the room the generator is located in by an approved method or assembly that has a fire-resistance rating of not less than ((~~2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2, the required fire-resistance rating shall be reduced to~~)) 1 hour.

((~~**[F] 403.4.8.3 Standby power loads.** The following are classified as standby power loads:~~

~~1. *Ventilation* and automatic fire detection equipment for *smokeproof* enclosures.~~

~~2. Elevators.~~

~~3. Where elevators are provided in a *high-rise building* for *accessible means of egress*, fire service access or occupant self-evacuation, the standby power system shall also comply with Sections 1009.4, 3007 or 3008, as applicable.~~))

[F] 403.4.8.4 Emergency power loads. The following are classified as emergency power loads:

1. Exit signs and *means of egress* illumination required by Chapter 10.
2. Elevator car lighting.
3. *Emergency voice/alarm communications systems*.
4. Automatic fire detection systems.
5. *Fire alarm* systems.
6. Electrically powered fire pumps.
7. Power and lighting for mechanical equipment rooms and the fire command center required by Section 403.4.6.
8. Lighting for elevator cars, machine rooms, machine spaces and control rooms.
9. Ventilation and cooling equipment for elevator machine rooms, machine spaces and control rooms.
10. Ventilation and automatic fire detection equipment for pressurized stairways and elevator hoistways.
11. Smoke control system.
12. A selected elevator in each elevator group, in accordance with Section 3016.9. All elevators shall be transferable to an *emergency power system*.

Note: No more than four cars are permitted within a hoistway. See Section 3016.10.

13. For fire service access and occupant evacuation elevators:
    - 13.1 Operation of all fire service access elevator cars.
    - 13.2 Operation of all occupant evacuation elevators until they are recalled.
    - 13.3. Elevator controller cooling equipment.
    - 13.4. For fire service access elevators only, elevator hoistway lighting.
    - 13.5. Sump pumps in elevator pits, where provided.
14. Emergency responder radio coverage.

[S] 403.5 Means of egress and evacuation. The *means of egress* in *high-rise buildings* shall comply with Sections 403.5.1 through 403.5.6.

403.5.1 Remoteness of interior exit stairways. Required *interior exit stairways* shall be separated by a distance not less than 30 feet (9144 mm) or not less than one-fourth of the length of the maximum overall diagonal dimension of the building or area to be served, whichever is less. The distance shall be measured in a straight line between the nearest points of the enclosure surrounding the *interior exit stairways*. In buildings with three or more *interior exit stairways*, not fewer than two of the *interior exit stairways* shall comply with this section. Interlocking or *scissor stairways* shall be counted as one *interior exit stairway*.

Exception: In buildings containing primarily Group R occupancies, required interior exit stairways are permitted to be separated by a distance not less than 15 feet (4572 mm).

403.5.2 Additional interior exit stairway. For buildings other than Group R-2 and their ancillary spaces that are more than 420 feet (128 m) in *building height*, one additional *interior exit stairway* meeting the requirements of Sections 1011 and 1023 shall be provided in addition to the minimum number of *exits* required by Section 1006.3. The stairway need only serve floors above the lowest level of exit discharge. The total capacity of any combination of remaining *interior exit stairways* with one *interior exit stairway* removed shall be not less than the total capacity required by Section 1005.1. *Scissor stairways* shall not be considered the additional *interior exit stairway* required by this section.

Interpretation I403.5.2 An additional interior exit stairway is not required when the building above the 420 foot level contains only Group R-2 occupancy. If the building above the 420 foot level contains a Group R-2 and another occupancy, or if the building does not contain a Group R-2 above the 420 foot level, then an additional interior exit stairway is required.

Exceptions:

1. ((~~An~~)) Subject to the approval of the *building official*, an additional *interior exit stairway* shall not be required to be installed in buildings having elevators used for occupant self-evacuation in accordance with Section ((~~3008~~)) 403.6.2.
2. An additional *interior exit stairway* shall not be required for other portions of the building where the highest occupiable floor level in those areas is less than 420 feet (128 m) in *building height.*

403.5.3 Stairway door operation. *Stairway* doors other than the *exit discharge* doors shall be permitted to be locked from the *stairway* side. *Stairway* doors that are locked from the *stairway* side shall be capable of being unlocked simultaneously without unlatching upon a signal from the *fire command center* and shall be capable of being unlocked simultaneously and automatically upon a signal from a fire alarm originating anywhere in the building. When stairway doors are installed that are not locked from the stairway side, wiring shall be installed to facilitate future installations of locking hardware.

403.5.3.1 Stairway communication system. A telephone or other two-way communications system connected to an *approved constantly attended station* shall be provided at not less than every fifth floor in each *stairway*. ((~~where the doors to the *stairway* are locked.~~))

403.5.4 ((~~Smokeproof enclosures~~)) Smoke control in exit stairways. Every required *interior exit stairway* serving floors more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access shall ((~~be a *smokeproof enclosure* in accordance~~)) comply with Sections 909.20 and 1023.11.

Exception: Unless required by other sections of this code, portions of such stairways which serve floors below the level of exit discharge are not required to comply with Sections 909.20 and 1023.11 if the portion of the stairway below the level of exit discharge is separated from the pressurized stairway with not less than 1 hour fire barriers or horizontal assemblies or both.

403.5.5 Luminous egress path markings. Luminous egress path markings shall be provided in accordance with Section 1025.

403.5.6 Emergency escape and rescue. Emergency escape and rescue openings specified in Section 1030 are not required.

403.5.7 Access to roofs. Access to all roof levels with a slope less than 4:12 shall be provided by stairways.

Exception: Access to unoccupied roofs is permitted to be provided by ship's ladders or alternating tread devices.

403.5.8 Termination of required stairways. All required interior exit stairways shall terminate at the roof level with an exterior door complying with Sections 1010.1.1 and 1010.1.2.

[S] 403.6 Elevators. Elevator installation and operation in *high-rise buildings* shall comply with Chapter 30 and ((~~Sections 403.6.1 and 403.6.2~~)) this section.

403.6.1 Fire service access elevator. In buildings with an occupied floor more than 120 feet (36 576 mm) above the lowest level of fire department vehicle access, every floor of the building shall be served by not fewer than two fire service access elevators ((~~, or all elevators, whichever is less, shall be provided~~)) in accordance with ((~~Section 3007~~)) this section. Each fire service access elevator shall have a capacity of not less than 3,500 pounds (1588 kg) and shall comply with Section ((~~3002.4~~)) 3016.12.

Exceptions:

1. Buildings with one elevator shall be provided with one fire service access elevator.
2. Floors below the lowest street-level building entrance are not required to be served by fire service access elevators.
3. Elevators serving only floors less than 75 feet above the lowest street-level building entrance are not required to be fire service access elevators.

403.6.1.1 Machine rooms. Each fire service access elevator shall be served by a different machine or control room.

403.6.1.2 Water protection. An *approved* method to prevent water from infiltrating into the hoistway enclosure from the operation of the *automatic sprinkler system* outside the fire service access elevator lobby shall be provided.

403.6.1.3 Hoistway enclosures. The fire service access elevator hoistway shall be located in a shaft enclosure complying with Section 713.

403.6.1.4 Hoistway lighting. When fire-fighters' emergency operation is active, the entire height of the hoistway shall be illuminated at not less than 1 footcandle (11 lux) as measured from the top of the car of each fire service access elevator.

403.6.1.5 Fire service access elevator lobby. The fire service access elevator shall open into a fire service access elevator lobby in accordance with Sections 403.6.1.5 through 403.6.1.5.5. Egress is permitted through the elevator lobby in accordance with Item 1 of Section 1016.2.

Exception: Where a fire service access elevator has two entrances onto a floor, the second entrance shall be permitted to open into an elevator lobby in accordance with Section 713.14.1.

403.6.1.5.1 Access to interior exit stairway or ramp. The fire service access elevator lobby shall have *direct access* from the enclosed elevator lobby to an enclosure for an interior exit stairway or ramp.

Exception: Access to an *interior exit stairway* or *ramp* shall be permitted to be through a protected path of travel that has a level of fire protection not less than the elevator lobby enclosure. The protected path shall be separated from the enclosed elevator lobby through an opening protected by a smoke and draft control assembly in accordance with Section 716.2.2.1.

403.6.1.5.2 Lobby enclosure. The fire service access elevator lobby shall be enclosed with a smoke barrier having a fire-resistance rating of not less than 1 hour, except that lobby doorways shall comply with Section 716.2.2.1.

Exceptions:

1. Enclosed fire service access elevator lobbies are not required at the *levels of exit discharge*.
2. Enclosed fire service access elevator lobbies are not required for elevators with pressurized hoistways.

403.6.1.5.3 Lobby doorways. Other than doors to the hoistway or elevator control room, each doorway to a fire service access elevator lobby shall be provided with a 3/4-hour *fire door assembly* complying with Section 716.2. The *fire door assembly* shall also comply with the smoke and draft control door assembly requirements of Section 716.2.2.1.1 with the UL 1784 test conducted without the artificial bottom seal.

403.6.1.5.4 Lobby size. Regardless of the number of fire service access elevators served by the same elevator lobby, the enclosed fire service access elevator lobby shall be not less than 150 square feet (14 m^2) in area with a minimum dimension of 8 feet (2440 mm).

403.6.1.5.5 Fire service access elevator symbol. A pictorial symbol of a standardized design designating which elevators are fire service access elevators shall be installed on each side of the hoistway door frame on the portion of the frame at right angles to the fire service access elevator lobby. The fire service access elevator symbol shall be designed as shown in Figure 403.6.1.5.5 and shall comply with the following:

1. The fire service access elevator symbol shall be not less than 3 inches (76 mm) in height.
2. The helmet shall contrast with the background, with either a light helmet on a dark background or a dark helmet on a light background.
3. The vertical center line of the fire service access elevator symbol shall be centered on the hoistway door frame. Each symbol shall be not less than 78 inches (1981 mm), and not more than 84 (2134 mm) inches above the finished floor at the threshold.

FIGURE 403.6.1.5.5
FIRE SERVICE ACCESS ELEVATOR SYMBOL

403.6.1.6 Elevator system monitoring. The fire service access elevator shall be continuously monitored at the fire command center by a standard emergency service interface system meeting the requirements of NFPA 72.

403.6.1.7 Protection of wiring or cables. Wires or cables that are located outside of the elevator hoistway and machine room and that provide normal or emergency power, control signals, communication with the car, lighting, heating, air conditioning, *ventilation* and fire-detecting systems to fire service access elevators shall be protected by construction having a *fire-resistance rating* of not less than 2 hours, shall be a circuit integrity cable having a *fire-resistance rating* of not less than 2 hours or shall be protected by a listed electrical protective system having a *fire-resistance rating* of not less than 2 hours.

Exception: Wiring and cables to control signals are not required to be protected provided that wiring and cables do not serve Phase II emergency in-car operations.

403.6.1.8 Standpipe hose connection. A Class I standpipe hose connection in accordance with Section 905 shall be provided in the interior exit stairway and ramp having direct access from the fire service access elevator lobby.

403.6.1.8.1 Access. The exit enclosure containing the standpipe shall have access to the floor without passing through the fire service access elevator lobby.

403.6.2 Occupant evacuation elevators. ((~~Where~~)) Elevators installed for compliance with Section 403.5.2, ((~~in accordance with Section 3008, passenger elevators for general public use~~)) shall ((~~be permitted to be used for occupant self-evacuation~~)) comply with Sections 403.6.2.1 through 403.6.2.10.1. Where other elevators are used for occupant self-evacuation, they shall also comply with these sections.

403.6.2.1 Number of occupant evacuation elevators. The number of elevators available for occupant evacuation shall be determined based on an egress analysis that addresses both of the following scenarios:

1. Full building evacuation where the analysis demonstrates that the number of elevators provided for evacuation results in an evacuation time less than one hour.
2. Evacuation of the 4 consecutive floors with the highest cumulative occupant load where the analysis demonstrates that the number of elevators provided for evacuation results in an evacuation time less than 15 minutes. Floors that are not atmospherically separated are considered one floor.

A minimum of one elevator in each elevator group shall be designated for occupant evacuation. Not less than two shall be provided in each occupant evacuation elevator lobby where more than one elevator opens into the lobby. Signage shall be provided to denote which elevators are available for occupant evacuation.

403.6.2.2 Fire safety and evacuation plan. The building shall have a fire safety and evacuation plan in accordance with the applicable requirements of Section 404 of the International Fire Code. The fire safety and evacuation plan shall incorporate specific procedures for the occupants using evacuation elevators.

403.6.2.3 Operation. The occupant evacuation elevators shall be used for occupant self-evacuation in accordance with the occupant evacuation operation requirements in ASME A17.1/CAS B44 and the building's fire safety and evacuation plan.

403.6.2.4 Water protection. An *approved* method to prevent water from infiltrating into the hoistway enclosure from the operation of the *automatic sprinkler system* outside the enclosed occupant evacuation elevator lobby shall be provided.

403.6.2.5 Hoistway enclosure protection. Occupant evacuation elevator hoistways shall be located in shaft enclosures complying with Section 713.

403.6.2.6 Occupant evacuation elevator lobby. The occupant evacuation elevators shall open into an elevator lobby in accordance with Sections 403.6.2.6 through 403.6.2.6.6. Egress is permitted through the elevator lobby in accordance with Item 1 of Section 1016.2.

403.6.2.6.1 Access to interior exit stairway or ramp. The occupant evacuation elevator lobby shall have *direct access* from the enclosed elevator lobby to an *interior exit stairway* or *ramp*.

Exceptions:

1. Access to an *interior exit stairway* or *ramp* shall be permitted to be through a protected path of travel that has a level of fire protection not less than the elevator lobby enclosure. The protected path shall be separated from the enclosed elevator lobby through an opening protected by a smoke and draft control assembly in accordance with Section 716.2.2.1.
2. Elevators that only service an open parking garage and the lobby of the building shall not be required to provide direct access in accordance with this section.

403.6.2.6.2 Lobby enclosure. The occupant evacuation elevator lobby shall be enclosed with a smoke barrier having a fire-resistance rating of not less than 1 hour, except that lobby doorways shall comply with Section 403.6.2.6.3.

Exception: Enclosed occupant evacuation elevator lobbies are not required at the levels of exit discharge.

403.6.2.6.3 Lobby doorways. Other than the doors to the hoistway, elevator machine rooms, machinery spaces and control rooms within the lobby enclosure smoke barrier, each doorway to an occupant evacuation elevator lobby shall be provided with a 3/4-hour *fire door assembly* complying with Section 716.2. The *fire door assembly* shall comply with the smoke and draft control assembly requirements of Section 716.2.2.1.1 with the UL 1784 test conducted without the artificial bottom seal.

403.6.2.6.3.1 Vision panel. A vision panel shall be installed in each *fire door assembly* protecting the lobby doorway. The vision panel shall consist of fire-protection-rated glazing and shall be located to furnish clear vision of the occupant evacuation elevator lobby.

403.6.2.6.3.2 Door closing. Each *fire door assembly* protecting the lobby doorway shall be automatic-closing upon receipt of any fire alarm signal from the *emergency voice/alarm communication system* serving the building.

403.6.2.6.4 Lobby size. Each occupant evacuation elevator lobby shall have minimum floor area as follows:

1. The occupant evacuation elevator lobby floor area shall accommodate, at 3 square feet (0.28 m^2) per person, not less than 25 percent of the occupant load of the floor area served by the lobby.
2. The occupant evacuation elevator lobby floor area also shall accommodate one wheelchair space of 30 inches by 48 inches (760 mm by 1220 mm) for each 50 persons, or portion thereof, of the occupant load of the floor area served by the lobby.

Exception: The size of lobbies serving multiple banks of elevators shall have the minimum floor area *approved* on an individual basis and shall be consistent with the building's fire safety and evacuation plan.

403.6.2.6.5 Signage. An *approved* sign indicating elevators are suitable for occupant self-evacuation shall be posted on all floors adjacent to each elevator call station serving occupant evacuation elevators.

403.6.2.6.6 Two-way communication system. A two-way communication system shall be provided in each occupant evacuation elevator lobby for the purpose of initiating communication with the fire command center or an alternate location *approved* by the fire department. The two-way communication system shall be designed and installed in accordance with Sections 1009.8.1 and 1009.8.2.

403.6.2.7 Elevator system monitoring. The occupant evacuation elevators shall be continuously monitored at the fire command center or a central control point *approved* by the fire department and arranged to display all of the following information:

1. Floor location of each elevator car.
2. Direction of travel of each elevator car.
3. Status of each elevator car with respect to whether it is occupied.
4. Status of normal power to the elevator equipment, elevator machinery and electrical apparatus cooling equipment where provided, elevator machine room and control room ventilation and cooling equipment.
5. Status of the *emergency power system* that provides backup power to the elevator equipment, elevator machinery and electrical cooling equipment where provided, elevator machine room and control room *ventilation* and cooling equipment.
6. Activation of any fire alarm initiating device in any elevator lobby, elevator machine room, machine space containing a motor controller or electric driving machine, control room or elevator hoistway.

403.6.2.8 Elevator recall. The fire command center or an alternate location *approved* by the fire department shall be provided with the means to manually initiate a Phase I Emergency Recall of the occupant evacuation elevators in accordance with ASME A17.1/CSA B44.

403.6.2.9 Protection of wiring or cables. Wires or cables that are located outside of the elevator hoistway, and machine room and control room and that provide normal or emergency power, control signals, communication with the car, lighting, heating, air conditioning, *ventilation* and fire-detecting systems to occupant evacuation elevators shall be protected by construction having a *fire-resistance rating* of not less than 2 hours, shall be circuit integrity cable having a fire-resistance rating of not less than 2 hours or shall be protected by a listed electrical circuit protective system having a fire-resistance rating of not less than 2 hours.

Exception: Wiring and cables to control signals that do not serve Phase II emergency in-car operations are not required to be protected.

403.6.2.10 Emergency voice/alarm communication system. The building shall be provided with an emergency voice/alarm communication system. The emergency voice/alarm communication system shall be accessible to the fire department. The system shall be provided in accordance with Section 907.5.2.2.

403.6.2.10.1 Notification appliances. No fewer than one audible and one visible notification appliance shall be installed within each occupant evacuation elevator lobby.

[S] 403.7 Signs. Signs complying with Sections 403.7.1 through 403.7.4 shall be provided in *high-rise buildings*.

403.7.1 Elevator lobbies. A sign shall be posted in every elevator lobby above each hall call fixture noting that the elevators will be recalled to the building lobby on fire alarm.

Exception: If *approved* by the *building official*, signs need not be posted in lobbies at the main egress level if the means of egress are obviously identifiable.

403.7.2 Recall floor lobbies. A sign indicating the number of each elevator shall be posted and maintained in the elevator lobby at each designated recall floor and at alternate floors of recall, if provided.

403.7.3 Stair re-entry signs. A sign shall be posted on each floor landing within a stairway indicating where re-entry is provided into the building or indicating the location of telephones or other means of two-way communication.

403.7.4 Other signs. Other signs required by this code, including but not limited to stairway identification signs required by Section 1023.9 and exit signs required by Section 1013, shall be provided.

[S] 403.8 Emergency operational plan. Prior to the issuance of a Certificate of Occupancy, the owner-occupant of the building shall assign a responsible person as the building's Fire Safety Director to establish an operational plan for the building. The operational plan shall contain the guidelines and procedures to be followed and responsibilities of the building employees and tenants under emergency conditions, including special provisions for persons with disabilities. The plan shall also include procedures for operation, maintenance and testing of the life safety systems and the allowable use and occupancy of each portion of the building. One copy of the operational plan shall be stored in the fire command center prior to issuance of the Certificate of Occupancy.

SECTION 404
ATRIUMS

404.1 General. In other than Group H occupancies, and where permitted by Section 712.1.7, the provisions of Sections 404.1 through 404.10 shall apply to buildings or structures containing vertical openings defined as "Atriums."

[S] 404.1.1 Presubmittal conference. The applicant shall arrange two presubmittal conferences with the design team, the *building official* and the *fire code official* in accordance with Sections 404.1.1.1 and 404.1.1.2. The purpose of the meeting is to obtain conceptual approval from the *building official* and the *fire code official.* The documentation of the presubmittal meeting shall be reflected on the plans for the building and become a permanent part of the Department of Construction and Inspection's records.

404.1.1.1 Atrium presubmittal conference. The applicant shall arrange an atrium presubmittal conference at least 60 days prior to submittal of a building permit application that contains the construction documents for any structural component of the building. The purpose of this presubmittal conference is to obtain conceptual approval of the design team approach to compliance with key provisions of this code related to atrium construction, excluding smoke control. The documentation of the atrium presubmittal meetings shall be reflected on the plans for the building and become a permanent part of the records of the Department of Construction and Inspections.

404.1.1.2 Smoke control presubmittal conference. The applicant shall arrange a smoke control presubmittal conference in accordance with Section 909.1.1.

404.2 Use. The floor of the *atrium* shall not be used for other than low fire hazard uses and only *approved* materials and decorations in accordance with the *International Fire Code* shall be used in the *atrium* space.

Exception: The *atrium* floor area is permitted to be used for any *approved* use where the individual space is provided with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

[S][F] 404.3 Automatic sprinkler protection. An *approved automatic sprinkler system* shall be installed throughout the entire building.

Exceptions:

1. That area of a building adjacent to or above the *atrium* need not be sprinklered provided that portion of the building is separated from the *atrium* portion by not less than 2-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both.
2. Where the ceiling of the *atrium* is more than 55 feet (16 764 mm) above ((~~the floor~~)) any floor area open to the *atrium*, sprinkler protection at the ceiling of the *atrium* is not required.

[F] 404.4 Fire alarm system. A *fire alarm* system shall be provided in accordance with Section 907.2.13.

[S] 404.5 Smoke control. A smoke control system shall be installed in accordance with Section 909.

Exceptions:

1. In other than Group I-2, and Group I-1, Condition 2, smoke control is not required for *atriums* that connect only two *stories*.
2. A smoke control system is not required for *atriums* connecting more than two stories when all of the following are met:
   - 2.1. Only the two lowest stories shall be permitted to be open to the *atrium*.
   - 2.2. All stories above the lowest two stories shall be separated from the *atrium* in accordance with Section 404.6.

[S] 404.6 Enclosure of atriums. *Atrium* spaces shall be separated from adjacent spaces by a 1-hour *fire barrier* constructed in accordance with Section 707 or a *horizontal assembly* constructed in accordance with Section 711, or both.

Exceptions:

1. A *fire barrier* is not required where a glass wall forming a smoke partition is provided. The glass wall shall comply with all of the following:

1.1. Automatic sprinklers are provided along both sides of the separation wall and doors, or on the room side only if there is not a walkway on the *atrium* side. The sprinklers shall be located between 4 inches and 12 inches (102 mm and 305 mm) away from the glass and at intervals along the glass not greater than 6 feet (1829 mm). The sprinkler system shall be designed so that the entire surface of the glass is wet upon activation of the sprinkler system without obstruction;

1.2. The glass wall shall be installed in a gasketed frame in a manner that the framing system deflects without breaking (loading) the glass before the sprinkler system operates; and

1.3. Where glass doors are provided in the glass wall, they shall be either *self-closing* or automatic-closing.

2. A *fire barrier* is not required where a glass-block wall assembly complying with Section 2110 and having a 3/4-hour *fire protection rating* is provided.

3. A *fire barrier* is not required between the *atrium* and the adjoining spaces of up to three floors of the *atrium* provided that such spaces are accounted for in the design of the smoke control system.

4. A fire barrier is not required between the atrium and the adjoining spaces where the atrium is not required to be provided with a smoke control system.

[S] 5. A fire barrier is not required between the atrium and the adjoining spaces for *atriums* that connect only two *stories*.

Code Alternate CA404.6: The separation between the *atrium* and tenant spaces that are not guest rooms or *dwelling units* is permitted to be omitted on four floors when:

1. The building is of Type IA or IB construction;
2. The perimeter of the opening is protected by draft curtains and a row of automatic sprinklers not more than 6 feet (1829 mm) on center as required for escalator protection;
3. All spaces of the building separated from the atrium by less than 1-hour fire-resistive construction are equipped with an automatic smoke detection system;
4. Tenant spaces open to the *atrium* have access to two *interior exit stairways* separated by one-half the building diagonal with one *exit* located so that occupants can exit in a direction away from the *atrium*. For the purpose of this requirement "away from the *atrium*" means not being forced to *exit* parallel and adjacent to the *atrium* opening. "Areas open to the *atrium*" are those areas that are not separated from the *atrium* with at least a 1-hour fire barrier.

[S][F] 404.7 ((~~Standby~~)) Emergency power system. Equipment required to provide smoke control shall be provided with ((~~standby~~)) an *emergency* power *system* in accordance with Section 909.11.

Code Alternate CA404.7: An *emergency power system* is not required for smoke control systems in buildings that have at least two *exits* and *atriums* with a total volume of less than 40,000 cubic feet (1133 m^3).

404.8 Interior finish. The *interior finish* of walls and ceilings of the *atrium* shall be not less than Class B. Sprinkler protection shall not result in a reduction in class.

404.9 Exit access travel distance. *Exit access* travel distance for areas open to an *atrium* shall comply with the requirements of this section.

404.9.1 Egress not through the atrium. Where required access to the *exits* is not through the *atrium*, *exit access* travel distance shall comply with Section 1017.

404.9.2 Exit access travel distance at the level of exit discharge. Where the path of egress travel is through an *atrium* space, *exit access* travel distance at the *level of exit discharge* shall be determined in accordance with Section 1017.

404.9.3 Exit access travel distance at other than the level of exit discharge. Where the path of egress travel is not at the *level of exit discharge* from the *atrium*, that portion of the total permitted *exit access* travel distance that occurs within the *atrium* shall be not greater than 200 feet (60 960 mm).

404.10 Interior exit stairways. Not greater than 50 percent of *interior exit stairways* are permitted to egress through an *atrium* on the *level of exit discharge* in accordance with Section 1028.

SECTION 405
UNDERGROUND BUILDINGS

[S] 405.1 General. The provisions of Sections 405.2 through 405.9 apply to building spaces having a floor level used for human occupancy more than 30 feet (9144 mm) below the finished floor of the lowest *level of exit discharge*.

Exceptions: The provisions of Section 405 are not applicable to the following buildings or portions of buildings:

1. One- and two-family *dwellings*, sprinklered in accordance with Section 903.3.1.3.
2. Parking garages provided with *automatic sprinkler systems* in compliance with Section 405.3.
3. Fixed guideway transit systems that comply with NFPA 130 as amended.
4. *Grandstands*, *bleachers*, stadiums, arenas and similar facilities.
5. Where the lowest *story* is the only *story* that would qualify the building as an underground building and has an area not greater than 1,500 square feet (139 m^2) and has an *occupant load* less than 10.
6. Pumping stations and other similar mechanical spaces intended only for limited periodic use by service or maintenance personnel.

405.2 Construction requirements. The underground portion of the building shall be of Type I construction.

[F] 405.3 Automatic sprinkler system. The highest *level of exit discharge* serving the underground portions of the building and all levels below shall be equipped with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1. Water-flow switches and control valves shall be supervised in accordance with Section 903.4.

405.4 Compartmentation. Compartmentation shall be in accordance with Sections 405.4.1 through 405.4.3.

405.4.1 Number of compartments. A building having a floor level more than 60 feet (18 288 mm) below the finished floor of the lowest *level of exit discharge* shall be divided into not fewer than two compartments of approximately equal size. Such compartmentation shall extend through the highest *level of exit discharge* serving the underground portions of the building and all levels below.

Exception: The lowest *story* need not be compartmented where the area is not greater than 1,500 square feet (139 m^2) and has an *occupant load* of less than 10.

405.4.2 Smoke barrier penetration. The compartments shall be separated from each other by a *smoke barrier* in accordance with Section 709. Penetrations between the two compartments shall be limited to plumbing and electrical piping and conduit that are firestopped in accordance with Section 714. Doorways shall be protected by *fire door assemblies* that comply with Section 716, automatic-closing by smoke detection in accordance with Section 716.2.6.6 and installed in accordance with NFPA 105 and Section 716.2.2.1. Where provided, each compartment shall have an air supply and an exhaust system independent of the other compartments.

405.4.3 Elevators. Where elevators are provided, each compartment shall have direct access to an elevator. Where an elevator serves more than one compartment, an enclosed elevator lobby shall be provided and shall be separated from each compartment by a *smoke barrier* in accordance with Section 709. Doorways in the smoke barrier shall be protected by fire door assemblies that comply with Section 716, shall comply with the smoke and draft control assembly requirements of Section 716.2.2.1 with the UL 1784 test conducted without an artificial bottom seal, and shall be automatic-closing by smoke detection in accordance with Section 716.2.6.6.

[S] 405.5 Smoke control system. A smoke control system shall be provided in accordance with Sections 405.5.1 and 405.5.2. The applicant shall arrange a smoke control presubmittal conference in accordance with Section 909.1.1.

405.5.1 Control system. A smoke control system is required to control the migration of products of combustion in accordance with Section 909 and the provisions of this section. Smoke control shall restrict movement of smoke to the general area of fire origin and maintain *means of egress* in a usable condition.

405.5.2 Compartment smoke control system. Where compartmentation is required, each compartment shall have an independent smoke control system. The system shall be automatically activated and capable of manual operation in accordance with Sections 907.2.17 and 907.2.18.

[F] 405.6 Fire alarm systems. A *fire alarm* system shall be provided where required by Sections 907.2.17 and 907.2.18.

[S] 405.7 Means of egress. *Means of egress* shall be in accordance with Sections 405.7.1 and 405.7.2.

405.7.1 Number of exits. Each floor level shall be provided with not fewer than two *exits*. Where compartmentation is required by Section 405.4, each compartment shall have not fewer than one *exit* and not fewer than one *exit access* doorway into the adjoining compartment.

405.7.2 ((~~Smokeproof enclosure~~)) Smoke control in exit stairways. Every required *stairway* serving floor levels more than 30 feet (9144 mm) below the finished floor of its *level of exit discharge* shall comply with ((~~the requirements for a *smokeproof enclosure* as provided in~~)) Section 1023.11.

[S][F] 405.8 ((~~Standby and emergency~~)) Emergency power system. ((~~A standby power system complying with Section 2702 shall be provided for the standby power loads specified in Section 405.8.1.~~)) An emergency power system complying with Section 2702 shall be provided for the emergency power loads specified in Section ((~~405.8.2~~)) 405.8.1.

((~~**[F] 405.8.1 Standby power loads.** The following are classified as standby power loads:~~

~~1. Smoke control system.~~

~~2. *Ventilation* and automatic fire detection equipment for *smokeproof* enclosures.~~

~~3. Elevators, as required in Section 3003.~~))

[F] ((~~405.8.2~~)) 405.8.1 Emergency power loads. The following are classified as emergency power loads:

1. *Emergency voice/alarm communications systems*.
2. *Fire alarm* systems.
3. Automatic fire detection systems.
4. Elevator car lighting.
5. Means of egress and exit sign illumination as required by Chapter 10.
6. Smoke control systems.
7. Ventilation and automatic fire detection equipment for pressurized interior exit stairways.

((~~6~~)) 8. Fire pumps.

9. Lighting for elevator cars, machine rooms, machine spaces and control rooms.
10. Ventilation and automatic fire detection equipment for pressurized stairways and elevator hoistways.
11. A selected elevator in each bank in accordance with Section 3016.9. A bank of elevators is a group of elevators or a single elevator controlled by a common operating system. All elevators that respond to a single call button constitute a bank of elevators. All elevators shall be transferable to an *emergency power system*.

Note: There is no limit on the number of cars that are permitted to be in a bank, but no more than four cars are permitted within a common hoistway. See Section 3016.10.

[F] 405.9 Standpipe system. The underground building shall be equipped throughout with a standpipe system in accordance with Section 905.

SECTION 406
MOTOR-VEHICLE-RELATED OCCUPANCIES

406.1 General. All motor-vehicle-related occupancies shall comply with Section 406.2. Private garages and carports shall also comply with Section 406.3. Open public parking garages shall also comply with Sections 406.4 and 406.5. Enclosed public parking garages shall also comply with Sections 406.4 and 406.6. Motor fuel-dispensing facilities shall also comply with Section 406.7. Repair garages shall also comply with Section 406.8.

Note: The Seattle Electrical Code requires that all occupancies provide one of the following to facilitate future installation of electric vehicle charging outlets:

1. Reserved space in the electrical service equipment for installation of an overcurrent protective device for electric vehicle charging system branch circuits, or
2. A designated location and working clearances for a future electric vehicle charging system panelboard.

See Seattle Electrical Code 220.57 and 625.27 for details.

[S] 406.2 Design. Private garages and carports, open and enclosed public parking garages, motor fuel-dispensing facilities and repair garages shall comply with Sections 406.2.1 through 406.2.9.

406.2.1 Automatic garage door openers and vehicular gates. Automatic garage door openers shall be listed and labeled in accordance with UL 325. Where provided, automatic vehicular gates shall comply with Section 3110.

406.2.2 Clear height. The clear height of each floor level in vehicle and pedestrian traffic areas shall be not less than ((~~7 feet (2134 mm)~~)) 6 feet 6 inches (1981 mm). Canopies under which fuels are dispensed shall have a clear height in accordance with Section 406.7.2.

Exception: A lower clear height is permitted for a parking tier in mechanical-access open parking garages where approved by the building official.

406.2.3 Accessible parking spaces. Where parking is provided, accessible parking spaces, access aisles and vehicular routes serving accessible parking shall be provided in accordance with Section 1106.

406.2.4 Floor surfaces. Floor surfaces shall be of concrete or similar approved noncombustible and nonabsorbent materials. ((~~The area of floor used for the parking of automobiles or other vehicles shall be sloped to facilitate the movement of liquids to a drain or toward the main vehicle entry doorway.~~)) The surface of vehicle fueling pads in motor fuel-dispensing facilities shall be in accordance with Section 406.7.1.

Exceptions:

1. Asphalt parking surfaces shall be permitted at ground level for public parking garages and private carports.

((~~2. Floors of Group S-2 parking garages shall not be required to have a sloped surface.~~

~~3~~)) 2. Slip-resistant, nonabsorbent, interior floor finishes having a critical radiant flux not more than 0.45 W/cm^2, as determined by ASTM E648 or NFPA 253, shall be permitted in repair garages.

406.2.5 Sleeping rooms. Openings between a motor vehicle-related occupancy and a room used for sleeping purposes shall not be permitted.

406.2.6 Fuel dispensing. The dispensing of fuel shall only be permitted in motor fuel-dispensing facilities in accordance with Section 406.7.

406.2.7 Electric vehicle charging stations. Where provided, electric vehicle charging stations shall be installed in accordance with NFPA 70. Electric vehicle charging system equipment shall be listed and labeled in accordance with UL 2202. Electric vehicle supply equipment shall be listed and labeled in accordance with UL 2594. Accessibility to electric vehicle charging stations shall be provided in accordance with Chapter 11.

406.2.8 Mixed occupancies and uses. Mixed uses shall be allowed in the same building as public parking garages and repair garages in accordance with Section 508.1. Mixed uses in the same building as an open parking garage are subject to Sections 402.4.2.3, 406.5.11, 508.1, 510.3, 510.4 and 510.7.

406.2.9 Equipment and appliances. Equipment and appliances shall be installed in accordance with Sections 406.2.9.1 through 406.2.9.3 and the *International Mechanical Code, International Fuel Gas Code* and NFPA 70.

406.2.9.1 Elevation of ignition sources. Equipment and appliances having an ignition source and located in hazardous locations and public garages, private garages, repair garages, automotive motor fuel-dispensing facilities and parking garages shall be elevated such that the source of ignition is not less than 18 inches (457 mm) above the floor surface on which the equipment or appliance rests. For the purpose of this section, rooms or spaces that are not part of the living space of a dwelling unit and that communicate directly with a private garage through openings shall be considered to be part of the private garage.

Exception: Elevation of the ignition source is not required for appliances that are listed as flammable vapor ignition resistant.

406.2.9.1.1 Parking garages. Connection of a parking garage with any room in which there is a fuel-fired appliance shall be by means of a vestibule providing a two-doorway separation, except that a single door is permitted where the sources of ignition in the appliance are elevated in accordance with Section 406.2.9.

Exception: This section shall not apply to appliance installations complying with Section 406.2.9.2 or 406.2.9.3.

406.2.9.2 Public garages. Appliances located in public garages, motor fuel-dispensing facilities, repair garages or other areas frequented by motor vehicles shall be installed not less than 8 feet (2438 mm) above the floor. Where motor vehicles are capable of passing under an appliance, the appliance shall be installed at the clearances required by the appliance manufacturer and not less than 1 foot (305 mm) higher than the tallest vehicle garage door opening.

Exception: The requirements of this section shall not apply where the appliances are protected from motor vehicle impact and installed in accordance with Section 406.2.9.1 and NFPA 30A.

406.2.9.3 Private garages. Appliances located in private garages and carports shall be installed with a minimum clearance of 6 feet (1829 mm) above the floor.

Exception: The requirements of this section shall not apply where the appliances are protected from motor vehicle impact and are installed in accordance with Section 406.2.9.1.

406.3 Private garages and carports. Private garages and carports shall comply with Sections 406.2 and 406.3, or they shall comply with Sections 406.2 and 406.4.

406.3.1 Classification. Private garages and carports shall be classified as Group U occupancies. Each private garage shall be not greater than 1,000 square feet (93 m^2) in area. Multiple private garages are permitted in a building where each private garage is separated from the other private garages by 1-hour *fire barriers* in accordance with Section 707, or 1-hour *horizontal assemblies* in accordance with Section 711, or both.

406.3.2 Separation. For other than private garages adjacent to dwelling units, the separation of private garages from other occupancies shall comply with Section 508. Separation of private garages from *dwelling units* shall comply with Sections 406.3.2.1 and 406.3.2.2.

406.3.2.1 Dwelling unit separation. The private garage shall be separated from the *dwelling unit* and its *attic* area by means of gypsum board, not less than 1/2 inch (12.7 mm) in thickness, applied to the garage side. Garages beneath habitable rooms shall be separated from all habitable rooms above by not less than a 5/8-inch (15.9 mm) Type X gypsum board or equivalent and 1/2-inch (12.7 mm) gypsum board applied to structures supporting the separation from habitable rooms above the garage. Door openings between a private garage and the *dwelling unit* shall be equipped with either solid wood doors or solid or honeycomb core steel doors not less than 1-3/8 inches (34.9 mm) in thickness, or doors in compliance with Section 716.2.2.1 with a fire protection rating of not less than 20 minutes. Doors shall be *self-closing* and self-latching.

7. Domestic cooking hoods installed and constructed in accordance with Section 505 of the *International Mechanical Code* shall be provided over cooktops and ranges.
8. Cooktops and ranges shall be protected in accordance with Section 904.13.
9. A shut-off for the fuel and electrical power supply to the cooking equipment shall be provided in a location that is accessible only to staff.
10. A timer shall be provided that automatically deactivates the cooking appliances within a period of not more than 120 minutes.
11. A portable fire extinguisher shall be provided. Installation shall be in accordance with Section 906, and the extinguisher shall be located within a 30-foot (9144 mm) distance of travel from each domestic cooking appliance.

407.3 Corridor wall construction. *Corridor* walls shall be constructed as smoke partitions in accordance with Section 710.

407.3.1 Corridor doors. *Corridor* doors, other than those in a wall required to be rated by Section 509.4 or for the enclosure of a vertical opening or an *exit*, shall not have a required *fire protection rating* and shall not be required to be equipped with *self-closing* or automatic-closing devices, but shall provide an effective barrier to limit the transfer of smoke and shall be equipped with positive latching. Roller latches are not permitted. Other doors shall conform to Section 716.

407.4 Means of egress. Group I-2 occupancies shall be provided with means of egress complying with Chapter 10 and Sections 407.4.1 through 407.4.4. The fire safety and evacuation plans provided in accordance with Section 1002.2 shall identify the building components necessary to support a *defend-in-place* emergency response in accordance with Sections 403 and 404 of the *International Fire Code*.

407.4.1 Direct access to a corridor. Habitable rooms in Group I-2 occupancies shall have an *exit access* door leading directly to a *corridor*.

Exceptions:

1. Rooms with *exit* doors opening directly to the outside at ground level.
2. Rooms arranged as *care suites* complying with Section 407.4.4.

407.4.1.1 Locking devices. Locking devices that restrict access to a care recipient's room from the *corridor* and that are operable only by staff from the *corridor* side shall not restrict the *means of egress* from the care recipient's room.

Exceptions:

1. This section shall not apply to rooms in psychiatric treatment and similar care areas.
2. Locking arrangements in accordance with Section 1010.1.9.7.

407.4.2 Distance of travel. The distance of travel between any point in a Group I-2 occupancy sleeping room, not located in a *care suite*, and an *exit access* door in that room shall be not greater than 50 feet (15 240 mm).

407.4.3 Projections in nursing home corridors. In Group I-2, Condition 1 occupancies, where the corridor width is not less than 96 inches (2440 mm), projections shall be permitted for furniture where all of the following criteria are met:

1. The furniture is attached to the floor or to the wall.
2. The furniture does not reduce the clear width of the corridor to less than 72 inches (1830 mm) except where other encroachments are permitted in accordance with Section 1005.7.
3. The furniture is positioned on only one side of the *corridor*.
4. Each arrangement of furniture is 50 square feet (4.6 m^2) maximum in area.
5. Furniture arrangements are separated by 10 feet (3048 mm) minimum.
6. Placement of furniture is considered as part of the fire and safety plans in accordance with Section 1002.2.

407.4.4 Group I-2 care suites. *Care suites* in Group I-2 shall comply with Sections 407.4.4.1 through 407.4.4.4 and either Section 407.4.4.5 or 407.4.4.6.

407.4.4.1 Exit access through care suites. *Exit* access from all other portions of a building not classified as a *care suite* shall not pass through a *care suite*. In a *care suite* required to have more than one *exit*, one *exit access* is permitted to pass through an adjacent *care suite* provided that all of the other requirements of Sections 407.4 and 1016.2 are satisfied.

[W] 407.4.4.2 Separation. *Care suites* shall be separated from other portions of the building, including other care suites, by a smoke partition complying with Section 710. <u>Partitions within suites are not required to be smoke resistant or fire resistance rated unless required by another section of this code.</u>

[W] 407.4.4.3 Access to corridor. Movement from habitable rooms shall not require passage through more than three doors and 100 feet (30 480 mm) distance of travel within the suite.

((~~**Exception:** The distance of travel shall be permitted to be increased to 125 feet (38 100 mm) where an automatic smoke detection system is provided throughout the *care suite* and installed in accordance with NFPA 72.~~))

407.4.4.4 Doors within care suites. Doors in care suites serving habitable rooms shall be permitted to comply with one of the following:

1. Manually operated horizontal sliding doors permitted in accordance with Exception 9 to Section 1010.1.2.
2. Power-operated doors permitted in accordance with Exception 7 to Section 1010.1.2.
3. Means of egress doors complying with Section 1010.

407.4.4.5 Care suites containing sleeping room areas. Sleeping rooms shall be permitted to be grouped into care suites where one of the following criteria is met:

1. The *care suite* is not used as an *exit access* for more than eight care recipient beds.
2. The arrangement of the *care suite* allows for direct and constant visual supervision into the sleeping rooms by care providers.
3. An automatic smoke detection system is provided in the sleeping rooms and installed in accordance with NFPA 72.

407.4.4.5.1 Area. *Care suites* containing sleeping rooms shall be not greater than 7,500 square feet (696 m^2) in area.

Exception: *Care suites* containing sleeping rooms shall be permitted to be not greater than 10,000 square feet (929 m^2) in area where an automatic smoke detection system is provided throughout the *care suite* and installed in accordance with NFPA 72.

407.4.4.5.2 Exit access. Any sleeping room, or any *care suite* that contains sleeping rooms, of more than 1,000 square feet (93 m^2) shall have not fewer than two *exit access* doors from the *care suite* located in accordance with Section 1007.

407.4.4.6 Care suites not containing sleeping rooms. Areas not containing sleeping rooms, but only treatment areas and the associated rooms, spaces or circulation space, shall be permitted to be grouped into *care suites* and shall conform to the limitations in Sections 407.4.4.6.1 and 407.4.4.6.2.

407.4.4.6.1 Area. *Care suites* of rooms, other than sleeping rooms, shall have an area not greater than 12,500 square feet (1161 m^2).

Exception: *Care suites* not containing sleeping rooms shall be permitted to be not greater than 15,000 square feet (1394 m^2) in area where an automatic smoke detection system is provided throughout the *care suite* in accordance with Section 907.

407.4.4.6.2 Exit access. *Care suites*, other than sleeping rooms, with an area of more than 2,500 square feet (232 m^2) shall have not fewer than two *exit access* doors from the *care suite* located in accordance with Section 1007.

407.5 Smoke barriers. *Smoke barriers* shall be provided to subdivide every *story* used by persons receiving care, treatment or sleeping into not fewer than two smoke compartments. Smoke barriers shall be provided to subdivide other *stories* with an *occupant load* of 50 or more persons, into not fewer than two *smoke compartments*. The *smoke barrier* shall be in accordance with Section 709.

407.5.1 Smoke compartment size. Stories shall be divided into smoke compartments with an area of not more than 22,500 square feet (2092 m^2) in Group I-2 occupancies.

Exceptions:

1. A smoke compartment in Group I-2, Condition 2 is permitted to have an area of not more than 40,000 square feet (3716 m^2) provided that all patient sleeping rooms within that smoke compartment are configured for single patient occupancy and any suite within the smoke compartment complies with Section 407.4.4.
2. A smoke compartment in Group I-2, Condition 2 without patient sleeping rooms is permitted to have an area of not more than 40,000 square feet (3716 m^2).

407.5.2 Exit access travel distance. The distance of travel from any point in a smoke compartment to a smoke barrier door shall be not greater than 200 feet (60 960 mm).

407.5.3 Refuge area. Refuge areas shall be provided within each *smoke compartment*. The size of the refuge area shall accommodate the occupants and care recipients from the adjoining *smoke compartment*. Where a *smoke compartment* is adjoined by two or more *smoke compartments*, the minimum area of the refuge area shall accommodate the largest *occupant load* of the adjoining compartments. The size of the refuge area shall provide the following:

1. Not less than 30 net square feet (2.8 m^2) for each care recipient confined to bed or stretcher.

2. Not less than 6 square feet (0.56 m^2) for each ambulatory care recipient not confined to bed or stretcher and for other occupants.

Areas or spaces permitted to be included in the calculation of refuge area are *corridors*, sleeping areas, treatment rooms, lounge or dining areas and other low-hazard areas.

407.5.4 Independent egress. A *means of egress* shall be provided from each *smoke compartment* created by *smoke barriers* without having to return through the smoke compartment from which *means of egress* originated. Smoke compartments that do not contain an exit shall be provided with direct access to not less than two adjacent smoke compartments.

[S] 407.5.5 Horizontal assemblies. *Horizontal assemblies* supporting *smoke barriers* required by this section shall be designed to resist the movement of smoke. Elevator lobbies shall be in accordance with Section ((~~3006.2~~)) 713.14.

407.6 Automatic-closing doors. Automatic-closing doors with hold-open devices shall comply with Sections 709.5 and 716.2.

[F] 407.7 Automatic sprinkler system. *Smoke compartments* containing sleeping rooms shall be equipped throughout with an *automatic sprinkler* system in accordance with Sections 903.3.1.1 and 903.3.2.

[F] 407.8 Fire alarm system. A *fire alarm* system shall be provided in accordance with Section 907.2.6.

[F] 407.9 Automatic fire detection. *Corridors* in Group I-2, Condition 1 occupancies and spaces permitted to be open to the *corridors* by Section 407.2 shall be equipped with an automatic fire detection system.

Group I-2, Condition 2 occupancies shall be equipped with smoke detection as required in Section 407.2.

Exceptions:

1. *Corridor* smoke detection is not required where sleeping rooms are provided with *smoke detectors* that comply with UL 268. Such detectors shall provide a visual display on the *corridor* side of each sleeping room and an audible and visual alarm at the care provider's station attending each unit.
2. *Corridor* smoke detection is not required where sleeping room doors are equipped with automatic door-closing devices with integral *smoke detectors* on the unit sides installed in accordance with their listing, provided that the integral detectors perform the required alerting function.

407.10 Secured yards. Grounds are permitted to be fenced and gates therein are permitted to be equipped with locks, provided that safe dispersal areas having 30 net square feet (2.8 m^2) for bed and stretcher care recipients and 6 net square feet (0.56 m^2) for ambulatory care recipients and other occupants are located between the building and the fence. Such provided safe dispersal areas shall be located not less than 50 feet (15 240 mm) from the building they serve.

[F] 407.11 Electrical systems. In Group I-2 occupancies, the essential electrical system for electrical components, equipment and systems shall be designed and constructed in accordance with the provisions of Chapter 27 and NFPA 99.

SECTION 408
GROUP I-3

408.1 General. Occupancies in Group I-3 shall comply with the provisions of Sections 408.1 through 408.11 and other applicable provisions of this code (see Section 308.5).

408.2 Other occupancies. Buildings or portions of buildings in Group I-3 occupancies where security operations necessitate the locking of required *means of egress* shall be permitted to be classified as a different occupancy. Occupancies classified as other than Group I-3 shall meet the applicable requirements of this code for that occupancy where provisions are made for the release of occupants at all times.

Means of egress from detention and correctional occupancies that traverse other use areas shall, as a minimum, conform to requirements for detention and correctional occupancies.

Exception: It is permissible to exit through a *horizontal exit* into other contiguous occupancies that do not conform to detention and correctional occupancy egress provisions but that do comply with requirements set forth in the appropriate occupancy, as long as the occupancy is not a Group H use.

408.3 Means of egress. Except as modified or as provided for in this section, the *means of egress* provisions of Chapter 10 shall apply.

408.3.1 Door width. Doors to resident *sleeping units* shall have a clear width of not less than 28 inches (711 mm).

408.3.2 Sliding doors. Where doors in a *means of egress* are of the horizontal-sliding type, the force to slide the door to its fully open position shall be not greater than 50 pounds (220 N) with a perpendicular force against the door of 50 pounds (220 N).

412.2.2 Means of egress and evacuation. The means of egress in airport traffic control towers shall comply with Sections 412.2.2.1 through 412.2.2.3.

[S] 412.2.2.1 Stairways. Stairways in airport traffic control towers shall be in accordance with Section 1011. Exit stairways shall be ((~~smokeproof enclosures complying with one of the alternatives provided in Section 909.20~~)) pressurized in accordance with Section 909.20 or 909.21.

Exception: Stairways in airport traffic control towers are not required to comply with Section 1011.12.

412.2.2.2 Exit access. From observation levels, airport traffic control towers shall be permitted to have a single means of exit access for a distance of travel not greater than 100 feet (30 480 mm). Exit access stairways from the observation level need not be enclosed.

412.2.2.3 Number of exits. Not less than one *exit stairway* shall be permitted for airport traffic control towers of any height provided that the *occupant load* per floor is not greater than 15 and the area per floor does not exceed 1,500 square feet (140 m^2).

412.2.2.3.1 Interior finish. Where an airport traffic control tower is provided with only one exit stairway, interior wall and ceiling finishes shall be either Class A or Class B.

412.2.2.3.2 Exit separation. Where an airport traffic control tower is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 and two exits are required, the exit separation distance required by Section 1007 shall be not less than one-fourth of the length of the maximum overall dimension of the area served.

[F] 412.2.3 Emergency systems. The detection, alarm and emergency systems of airport traffic control towers shall comply with Sections 412.2.3.1 through 412.2.3.3.

[F] 412.2.3.1 Automatic smoke detection systems. Airport traffic control towers shall be provided with an automatic smoke detection system installed in accordance with Section 907.2.21.

[F] 412.2.3.2 Fire command center. A fire command center shall be provided in airport traffic control towers where the control cab is located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access. The fire command center shall comply with Section 911.

Exceptions:

1. The fire command center shall be located in the airport control tower or an adjacent contiguous building where building functions are interdependent.
2. The room shall be not less than 150 square feet (14 m^2) in area with a minimum dimension of 10 feet (3048 mm).
3. The following features shall not be required in an airport traffic control tower fire command center.
   - 3.1. Emergency voice/alarm control unit.
   - 3.2. Public address system.
   - 3.3. Status indicators and controls for the air distributions centers.
   - 3.4. Generator supervision devices, manual start and transfer features.
   - 3.5. Elevator emergency or standby power switches where emergency or standby power is provided.

[F] 412.2.3.3 Smoke removal. Smoke removal in airport traffic control towers shall be provided in accordance with Section 403.4.7.

[F] 412.2.4 Automatic sprinkler system. Where an occupied floor is located more than 35 feet (10 668 mm) above the lowest level of fire department vehicle access, airport traffic control towers shall be equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

[F] 412.2.4.1 Fire pump room. Fire pumps shall be located in rooms that are separated from all other areas of the building by 2-hour fire barriers constructed in accordance with Section 707 or 2-hour horizontal assemblies constructed in accordance with Section 711, or both.

Exception: Separation is not required for fire pumps physically separated in accordance with NFPA 20.

[S][F] 412.2.5 Protection of elevator wiring and cables. Wiring and cables serving elevators in airport traffic control towers shall be protected in accordance with Section ((~~3007.8.1~~)) 403.6.2.9.

412.2.5.1 Elevators for occupant evacuation. Where provided in addition to an exit stairway, occupant evacuation elevators shall be in accordance with Section ((~~3008~~)) 403.6.2.

412.2.6 Accessibility. Airport traffic control towers shall be *accessible* except as specified in Section 1104.4.

412.3 Aircraft hangars. Aircraft hangars shall be in accordance with Sections 412.3.1 through 412.3.6.

412.3.1 Exterior walls. *Exterior walls* located less than 30 feet (9144 mm) from *lot lines* or a *public way* shall have a *fire-resistance rating* not less than 2 hours.

5. Spray finishing operations.
6. Total fuel capacity of all aircraft within the unsprinklered single *fire area* in excess of 1,600 gallons (6057 L).
7. Total fuel capacity of all aircraft within the maximum single *fire area* in excess of 7,500 gallons (28 390 L) for a hangar with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

[F] 412.3.6.2 Separation of maximum single fire areas. Maximum single *fire areas* established in accordance with hangar classification and construction type in Table 412.3.6 shall be separated by 2-hour *fire walls* constructed in accordance with Section 706. In determining the maximum single *fire area* as set forth in Table 412.3.6, ancillary uses that are separated from aircraft servicing areas by a *fire barrier* of not less than 1 hour, constructed in accordance with Section 707, shall not be included in the area.

[S] 412.3.6.3 Restrictions in the Fire District. Aircraft hangars shall not be located in the *Fire District* unless work is limited to exchange of parts and maintenance requiring no open flame or welding.

412.4 Residential aircraft hangars. *Residential aircraft hangars* shall comply with Sections 412.4.1 through 412.4.5.

412.4.1 Fire separation. A hangar shall not be attached to a *dwelling* unless separated by a *fire barrier* having a *fire-resistance rating* of not less than 1 hour. Such separation shall be continuous from the foundation to the underside of the roof and unpierced except for doors leading to the *dwelling unit*. Doors into the *dwelling unit* shall be equipped with *self-closing* devices and conform to the requirements of Section 716 with a noncombustible raised sill not less than 4 inches (102 mm) in height. Openings from a hangar directly into a room used for sleeping purposes shall not be permitted.

412.4.2 Egress. A hangar shall provide two *means of egress*. One of the doors into the dwelling shall be considered as meeting only one of the two *means of egress*.

[**F] 412.4.3 Smoke alarms.** *Smoke alarms* shall be provided within the hangar in accordance with Section 907.2.21.

412.4.4 Independent systems. Electrical, mechanical and plumbing drain, waste and vent (DWV) systems installed within the hangar shall be independent of the systems installed within the dwelling. Building sewer lines shall be permitted to be connected outside the structures.

Exception: *Smoke detector* wiring and feed for electrical subpanels in the hangar.

412.4.5 Height and area limits. *Residential aircraft hangars* shall be not greater than 2,000 square feet (186 m^2) in area and 20 feet (6096 mm) in *building height*.

[F] 412.5 Aircraft paint hangars. Aircraft painting operations shall be conducted in an aircraft paint hangar that complies with the provisions of Sections 412.5.1 through 412.5.8. Buildings and structures, or parts thereof, used for the application of flammable finishes shall comply with the applicable provisions of Section 416.

[F] 412.5.1 Occupancy classification. Aircraft paint hangars shall be classified in accordance with the provisions of Section 307.1. Aircraft paint hangars shall comply with the applicable requirements of this code and the *International Fire Code* for such occupancy.

412.5.2 Construction. Aircraft paint hangars shall be of Type I or II construction.

[F] 412.5.3 Spray equipment cleaning operations. Spray equipment cleaning operations shall be conducted in a liquid use, dispensing and mixing room.

[F] 412.5.4 Operations. Only those flammable liquids necessary for painting operations shall be permitted in quantities less than the maximum allowable quantities per *control area* in Table 307.1(1). Spray equipment cleaning operations exceeding the maximum allowable quantities per control area in Table 307.1(1) shall be conducted in a liquid use, dispensing and mixing room.

[F] 412.5.5 Storage. Storage of flammable or combustible liquids exceeding the maximum allowable quantities per control area in Table 307.1(1) shall be in a liquid storage room.

[F] 412.5.6 Fire suppression. Aircraft paint hangars shall be provided with fire suppression as required by NFPA 409.

[F] 412.5.7 Ventilation. Aircraft paint hangars shall be provided with *ventilation* as required in the *International Mechanical Code*.

[F] 412.5.8 Electrical. Electrical equipment and devices within the aircraft paint hangar shall comply with NFPA 70.

[F] 412.5.8.1 Class I, Division I hazardous locations. The area within 10 feet (3048 mm) horizontally from aircraft surfaces and from the floor to 10 feet (3048 mm) above the aircraft surface shall be classified as a Class I, Division I location.

[F] 412.5.8.2 Class I, Division 2 hazardous locations. The area horizontally from aircraft surfaces between 10 feet (3048 mm) and 30 feet (9144 mm) and from the floor to 30 feet (9144 mm) above the aircraft surface shall be classified as a Class I, Division 2 location.

412.6 Aircraft manufacturing facilities. In buildings used for the manufacturing of aircraft, exit access travel distances indicated in Section 1017.1 shall be increased in accordance with the following:

1. The building shall be of Type I or II construction.

2. Exit access travel distance shall not exceed the distances given in Table 412.6.

TABLE 412.6
AIRCRAFT MANUFACTURING EXIT ACCESS TRAVEL DISTANCE

HEIGHT (feet)[b]	MANUFACTURING AREA (sq. ft.)[a]					
	≥ 150,000	≥ 200,000	≥ 250,000	≥ 500,000	≥ 750,000	≥ 1,000,000
≥ 25	400	450	500	500	500	500
≥ 50	400	500	600	700	700	700
≥ 75	400	500	700	850	1,000	1,000
≥ 100	400	500	750	1,000	1,250	1,500

For SI: 1 foot = 304.8 mm.
a. Contiguous floor area of the aircraft manufacturing facility having the indicated height.
b. Minimum height from finished floor to bottom of ceiling or roof slab or deck.

412.6.1 Ancillary areas. Rooms, areas and spaces ancillary to the primary manufacturing area shall be permitted to egress through such area having a minimum height as indicated in Table 412.6. Exit access travel distance within the ancillary room, area or space shall not exceed that indicated in Table 1017.2 based on the occupancy classification of that ancillary area. Total exit access travel distance shall not exceed that indicated in Table 412.6.

[F] 412.7 Heliports and helistops. *Heliports* and *helistops* shall be permitted to be erected on buildings or other locations where they are constructed in accordance with Sections 412.7.1 through 412.7.5.

[F] 412.7.1 Size. The landing area for helicopters less than 3,500 pounds (1588 kg) shall be not less than 20 feet (6096 mm) in length and width. The landing area shall be surrounded on all sides by a clear area having an average width at roof level of 15 feet (4572 mm), and all widths shall be not less than 5 feet (1524 mm).

[F] 412.7.2 Design. Helicopter landing areas and the supports thereof on the roof of a building shall be noncombustible construction. Landing areas shall be designed to confine any flammable liquid spillage to the landing area itself and provisions shall be made to drain such spillage away from any *exit* or *stairway* serving the helicopter landing area or from a structure housing such *exit* or *stairway*. For structural design requirements, see Section 1607.6.

[W] 412.7.3 Means of egress. The *means of egress* from *heliports*, *helipads*, and *helistops* shall comply with the provisions of Chapter 10. Landing areas located on buildings or structures shall have two or more *means of egress.* For landing areas less than 60 feet (18 288 mm) in length or less than 2,000 square feet (186 m^2) in area, the second *means of egress* is permitted to be a fire escape, *alternating tread device* or ladder leading to the floor below. On Group I-2 roofs with heliports or helipads and helistops, rooftop structures enclosing exit stair enclosures or elevator shafts shall be enclosed with fire barriers and opening protectives that match the rating of their respective shaft enclosures below.

[F] 412.7.4 Rooftop heliports and helistops. Rooftop *heliports* and *helistops* shall comply with NFPA 418.

[F] 412.7.5 Standpipe system. In buildings equipped with a standpipe system, the standpipe shall extend to the roof level in accordance with Section 905.3.6.

[S] 412.7.6 Restrictions in the Fire District. Heliports shall not be located in the *Fire District*.

SECTION 413
COMBUSTIBLE STORAGE

413.1 General. High-piled stock or rack storage in any occupancy group shall comply with the *International Fire Code.*

413.2 Attic, under-floor and concealed spaces. *Attic,* under-floor and concealed spaces used for storage of combustible materials shall be protected on the storage side as required for 1-hour fire-resistance-rated construction. Openings shall be protected by assemblies that are *self-closing* and are of noncombustible construction or solid wood core not less than 1-3/4 inch (45 mm) in thickness.

Exception: Neither fire-resistance-rated construction nor opening protectives are required in any of the following locations:

1. Areas protected by *approved automatic sprinkler systems*.
2. Group R-3 and U occupancies.

[S] 413.3 Mini-storage warehouses. In mini-storage warehouse buildings, individual storage lockers shall be separated from each other with fire partitions.

Exception: The separation between individual storage lockers is permitted to be non-rated in rooms 500 square feet (46 m^2) or less in area and in sprinklered rooms of any size.

[S] 413.4 Basement storage and sale of combustible materials. Storage and sale of combustible material in basements shall be in accordance with Sections 413.4.1 through 413.4.5.

Exception: Areas protected with an *approved automatic sprinkler system* that are separated from other areas in the basement by fire barriers with at least a one-hour fire resistance rating are not required to comply with this section.

413.4.1 Storage room size. Combustible material being stored or available for sales shall be placed in rooms no larger than 500 square feet (46.5 m^2).

413.4.2 Storage room construction. Each storage room shall be separated from other areas by fire barriers with at least a one hour fire-resistance rating.

413.4.3 Number of storage rooms. There shall be a maximum of three storage rooms within any one basement.

413.4.4 Storage room access. Each storage room shall be provided with access directly from the building exterior, or through a one-hour fire resistance rated corridor between each room and an exterior door or *exit* enclosure.

413.4.5 Storage room restrictions. Storage rooms shall not contain any material classified as a flammable liquid, hazardous material, or highly combustible material.

SECTION 414
HAZARDOUS MATERIALS

[S][F] 414.1 General. The provisions of Sections 414.1 through 414.6 shall apply to buildings and structures occupied for the manufacturing, processing, dispensing, use or storage of hazardous materials.

[F] 414.1.1 Other provisions. Buildings and structures with an occupancy in Group H shall comply with this section and the applicable provisions of Section 415 and the *International Fire Code*.

[F] 414.1.2 Materials. The safe design of hazardous material occupancies is material dependent. Individual material requirements are found in Sections 307 and 415, the *International Mechanical Code* and the *International Fire Code*.

[F] 414.1.2.1 Aerosol products. Level 2 and 3 aerosol products shall be stored and displayed in accordance with the *International Fire Code*. See Section 311.2 and the *International Fire Code* for occupancy group requirements.

[F] 414.1.3 Information required. A report shall be submitted to the *building official* identifying the maximum expected quantities of hazardous materials to be stored, used in a *closed system* and used in an *open system*, and subdivided to separately address hazardous material classification categories based on Tables 307.1(1) and 307.1(2). The methods of protection from such hazards, including but not limited to *control areas*, fire protection systems and Group H occupancies shall be indicated in the report and on the *construction documents*. The opinion and report shall be prepared by a qualified person, firm or corporation *approved* by the *building official* and provided without charge to the enforcing agency.

For buildings and structures with an occupancy in Group H, separate floor plans shall be submitted identifying the locations of anticipated contents and processes so as to reflect the nature of each occupied portion of every building and structure.

414.1.4 Presubmittal conference. Prior to application for a permit for a Group H-5 Occupancy, the applicant shall arrange a presubmittal conference with the design team, the *building official* and *fire code official* to review the proposed emergency life safety systems for the building and the appropriate protection of the life safety systems. For Group H-4 occupancies, a presubmittal conference is recommended. The purpose of the meeting is to obtain conceptual approval from the *building official* and the *fire code official* of the proposed systems.

Applicants shall bring to the conference preliminary building plans and a draft of the Hazardous Materials Management Plan. The building permit shall not be issued until the *building official* and *fire code official* have *approved*, in writing, the emergency life safety systems for the building and the protection of the life safety systems. The documentation of the presubmittal meeting shall be reflected on the plans for the building and become a permanent part of the Department of Construction and Inspection's records.

414.1.5 Hazardous material areas in buildings over 420 feet in building height. In buildings in which an occupant evacuation elevator is used to comply with Section 403.6.2, no building areas shall contain hazardous materials exceeding the maximum allowable quantities per *control area* as addressed in Section 414.2.

[S][F] 414.2 Control areas. *Control areas* shall comply with Sections 414.2.1 through 414.2.5 and the *International Fire Code*.

Exception: Higher education laboratories in accordance with Section 428 and Chapter 38 of the *International Fire Code*.

[F] 414.2.1 Construction requirements. *Control areas* shall be separated from each other by *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both.

[F] 414.2.2 Percentage of maximum allowable quantities. The percentage of maximum allowable quantities of hazardous materials per *control area* permitted at each floor level within a building shall be in accordance with Table 414.2.2.

Exception: *Non-production laboratory facilities* are permitted to be in accordance with Section 414.7.

[F] TABLE 414.2.2
DESIGN AND NUMBER OF CONTROL AREAS

STORY		PERCENTAGE OF THE MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA[a]	NUMBER OF CONTROL AREAS PER STORY	FIRE-RESISTANCE RATING FOR FIRE BARRIERS IN HOURS[b]
Above grade plane	Higher than 9	5	1	2
	7–9	5	2	2
	6	12.5	2	2
	5	12.5	2	2
	4	12.5	2	2
	3	50	2	1
	2	75	3	1
	1	100	4	1
Below grade plane	1	75	3	1
	2	50	2	1
	Lower than 2	Not Allowed	Not Allowed	Not Allowed

a. Percentages shall be of the maximum allowable quantity per control area shown in Tables 307.1(1) and 307.1(2), with all increases allowed in the notes to those tables.

b. Separation shall include fire barriers and horizontal assemblies as necessary to provide separation from other portions of the building.

[F] 414.2.3 Number. The maximum number of *control areas* within a building shall be in accordance with Table 414.2.2.

Exception: *Non-production laboratory facilities* are permitted to be in accordance with Section 414.7.

[F] 414.2.4 Fire-resistance rating requirements. The required *fire-resistance rating* for *fire barriers* shall be in accordance with Table 414.2.2 or Table 414.7 for *non-production laboratory facilities*. The floor assembly of the *control area* and the construction supporting the floor of the *control area* shall have a *fire-resistance rating* of not less than 2 hours.

Exception: The floor assembly of the *control area* and the construction supporting the floor of the *control area* are allowed to be 1-hour fire-resistance-rated in buildings of Types IIA, IIIA, IV and VA construction, provided that both of the following conditions exist:

1. The building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.
2. The building is three or fewer *stories above grade plane*.

[F] 414.2.5 Hazardous material in Group M display and storage areas and in Group S storage areas. Hazardous materials located in Group M and Group S occupancies shall be in accordance with Sections 414.2.5.1 through 414.2.5.3.

[F] 414.2.5.1 Nonflammable solids and nonflammable and noncombustible liquids. The aggregate quantity of nonflammable solid and nonflammable or noncombustible liquid hazardous materials permitted within a single *control* area of a Group M display and storage area, a Group S storage area or an outdoor *control* area is permitted to exceed the maximum allowable quantities per *control area* specified in Tables 307.1(1) and 307.1(2) without classifying the building or use as a Group H occupancy, provided that the materials are displayed and stored in accordance with the *International Fire Code* and quantities do not exceed the maximum allowable specified in Table 414.2.5(1).

[F] TABLE 414.2.5(2)
MAXIMUM ALLOWABLE QUANTITY OF FLAMMABLE AND COMBUSTIBLE LIQUIDS IN WHOLESALE AND RETAIL SALES OCCUPANCIES PER CONTROL AREA[a]

TYPE OF LIQUID	MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA (gallons)		
	Sprinklered in accordance with note b densities and arrangements	Sprinklered in accordance with Tables 5704.3.6.3(4) through 5704.3.6.3(8) and 5704.3.7.5.1 of the *International Fire Code*	Nonsprinklered
Class IA	60	60	30
Class IB, IC, II and IIIA	7,500[c]	15,000[c]	1,600
Class IIIB	Unlimited	Unlimited	13,200

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 gallon = 3.785 L, 1 gallon per minute per square foot = 40.75 L/min/m^2.

a. Control areas shall be separated from each other by not less than a 1-hour fire barrier wall.

b. To be considered as sprinklered, a building shall be equipped throughout with an approved automatic sprinkler system with a design providing minimum densities as follows:

1. For uncartoned commodities on shelves 6 feet or less in height where the ceiling height does not exceed 18 feet, quantities are those permitted with a minimum sprinkler design density of Ordinary Hazard Group 2.
2. For cartoned, palletized or racked commodities where storage is 4 feet 6 inches or less in height and where the ceiling height does not exceed 18 feet, quantities are those permitted with a minimum sprinkler design density of 0.21 gallon per minute per square foot over the most remote 1,500-square-foot area.

c. Where wholesale and retail sales or storage areas exceed 50,000 square feet in area, the maximum allowable quantities are allowed to be increased by 2 percent for each 1,000 square feet of area in excess of 50,000 square feet, up to not more than 100 percent of the table amounts. A control area separation is not required. The cumulative amounts, including amounts attained by having an additional control area, shall not exceed 30,000 gallons.

[F] 414.2.5.3 Aerosol products. The maximum quantity of aerosol products in Group M occupancy retail display areas, storage areas adjacent to retail display areas and retail storage areas shall be in accordance with the *International Fire Code.*

[F] 414.3 Ventilation. Rooms, areas or spaces in which explosive, corrosive, combustible, flammable or highly toxic dusts, mists, fumes, vapors or gases are or have the potential to be emitted due to the processing, use, handling or storage of materials shall be mechanically ventilated where required by this code, the *International Fire Code* or the *International Mechanical Code.*

Emissions generated at workstations shall be confined to the area in which they are generated as specified in the *International Fire Code* and the *International Mechanical Code*.

[F] 414.4 Hazardous material systems. Systems involving hazardous materials shall be suitable for the intended application. Controls shall be designed to prevent materials from entering or leaving process or reaction systems at other than the intended time, rate or path. Automatic controls, where provided, shall be designed to be fail safe.

[S][F] 414.5 Inside storage, dispensing and use. The inside storage, dispensing and use of hazardous materials shall be in accordance with Sections 414.5.1 through 414.5.3 of this code and the *International Fire Code.*

[F] 414.5.1 Explosion control. Explosion control shall be provided in accordance with the *International Fire Code* as required by Table 414.5.1 where quantities of hazardous materials specified in that table exceed the maximum allowable quantities in Table 307.1(1) or where a structure, room or space is occupied for purposes involving explosion hazards as required by Section 415 or the *International Fire Code*.

[F] 414.5.2 Emergency or standby power. Where required by the *International Fire Code* or this code, mechanical ventilation, treatment systems, temperature control, alarm, detection or other electrically operated systems shall be provided with emergency or legally required standby power in accordance with Section 2702 and the *International Fire Code*. For storage and use areas for highly toxic or toxic materials, see Sections 6004.2.2.8 and 6004.3.4.2 of the *International Fire Code*.

[F] 414.5.2.1 Exempt applications. Emergency or standby power is not required for the mechanical ventilation systems provided for any of the following:

1. Storage of Class IB and IC flammable and combustible liquids in closed containers not exceeding 6.5 gallons (25 L) capacity.
2. Storage of Class 1 and 2 oxidizers.
3. Storage of Class II, III, IV and V organic peroxides.
4. Storage of asphyxiant, irritant and radioactive gases.

[F] 414.5.2.2 Fail-safe engineered systems. Standby power for mechanical ventilation, treatment systems and temperature control systems shall not be required where an approved fail-safe engineered system is installed.

[F] 414.5.3 Spill control, drainage and containment. Rooms, buildings or areas occupied for the storage of solid and liquid hazardous materials shall be provided with a means to control spillage and to contain or drain off spillage and fire protection water discharged in the storage area where required in the *International Fire Code*. The methods of spill control shall be in accordance with the *International Fire Code*.

[F] 414.6 Outdoor storage, dispensing and use. The outdoor storage, dispensing and use of hazardous materials shall be in accordance with the *International Fire Code*.

[F] 414.6.1 Weather protection. Where weather protection is provided for sheltering outdoor hazardous material storage or use areas, such areas shall be considered outdoor storage or use where the weather protection structure complies with Sections 414.6.1.1 through 414.6.1.3.

[F] 414.6.1.1 Walls. Walls shall not obstruct more than one side of the structure.

Exception: Walls shall be permitted to obstruct portions of multiple sides of the structure, provided that the obstructed area is not greater than 25 percent of the structure's perimeter.

[F] 414.6.1.2 Separation distance. The distance from the structure to buildings, *lot lines*, *public ways* or *means of egress* to a *public way* shall be not less than the distance required for an outside hazardous material storage or use area without weather protection.

[F] 414.6.1.3 Noncombustible construction. The overhead structure shall be of *approved* noncombustible construction with a maximum area of 1,500 square feet (140 m^2).

Exception: The maximum area is permitted to be increased as provided by Section 506.

[S] 414.7 Non-production laboratory facilities. *Non-production laboratory facilities* are permitted to comply with Sections 414.7.1 through 414.7.4.

414.7.1 Maximum allowable quantity per control area. The aggregate amount of hazardous materials in a *control area* shall not exceed the percentage specified in Table 414.7.

414.7.2 Fire-resistance-rating requirements. The required fire-resistance rating for fire barriers shall be in accordance with Table 414.7 for *non-production laboratory facilities*.

414.7.3 Storage. Storage in control areas shall be in accordance with this code and Sections 414.7.3.1 through 414.7.3.2.

414.7.3.1 Density. Storage of Class I flammable liquids shall not exceed 4 gallons per 100 square feet (0.13 L/m^2) of floor area above floor level 6.

414.7.3.2 Container size. Individual containers in storage shall not exceed 1 gallon (3.8 L) for Class I flammable liquids.

414.7.4 Automatic sprinkler system. An *approved automatic sprinkler system* shall be installed throughout a building containing a *non-production laboratory facility*. The sprinkler system shall be designed to protect an ordinary hazard group 2 occupancy.

[S] TABLE 414.7
DESIGN AND NUMBER OF CONTROL AREAS IN NON-PRODUCTION LABORATORY FACILITIES[A]

FLOOR LEVEL		PERCENTAGE OF THE MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA[B]	NUMBER OF CONTROL AREAS PER FLOOR	FIRE-RESISTANCE RATING FOR FIRE BARRIERS IN HOURS[C, D]
Above Grade Plane	Higher than 20	Not Allowed	Not Allowed	Not Allowed
	6-20	15	2	2
	5	25	2	2
	4	25	2	2
	3	50	2	2
	2	75	2	1
	1	100	2	1
Below Grade Plane	1	75	2	1
	2	50	2	1
	Lower than 2	Not Allowed	Not Allowed	Not Allowed

a. Table 414.7 applies to *non-production laboratory facilities* meeting the criteria of Section 414.7.
b. Percentages shall be of the maximum allowable quantity per control area shown in Tables 307.1(1) and 307.1 (2) with all increases allowed in the footnotes to those tables.
c. Fire barriers shall include walls and floors as necessary to provide separation from other portions of the building.
d. Vertical fire barriers separating control areas from other spaces on the same floor may be one-hour rated.

SECTION 415
GROUPS H-1, H-2, H-3, H-4 AND H-5

[F] 415.1 General. The provisions of Sections 415.1 through 415.11 shall apply to the storage and use of hazardous materials in excess of the maximum allowable quantities per *control area* listed in Section 307.1.

[F] 415.2 Compliance. Buildings and structures with an occupancy in Group H shall comply with the applicable provisions of Section 414 and the *International Fire Code*.

[F] 415.3 Automatic fire detection systems. Group H occupancies shall be provided with an automatic fire detection system in accordance with Section 907.2.

[F] 415.4 Automatic sprinkler system. Group H occupancies shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.2.5.

[F] 415.5 Emergency alarms. Emergency alarms for the detection and notification of an emergency condition in Group H occupancies shall be provided as set forth herein.

[F] 415.5.1 Storage. An approved manual emergency alarm system shall be provided in buildings, rooms or areas used for storage of hazardous materials. Emergency alarm-initiating devices shall be installed outside of each interior exit or exit access door of storage buildings, rooms or areas. Activation of an emergency alarm-initiating device shall sound a local alarm to alert occupants of an emergency situation involving hazardous materials.

[F] 415.5.2 Dispensing, use and handling. Where hazardous materials having a hazard ranking of 3 or 4 in accordance with NFPA 704 are transported through corridors, interior exit stairways or ramps, or exit passageways, there shall be an emergency telephone system, a local manual alarm station or an approved alarm-initiating device at not more than 150-foot (45 720 mm) intervals and at each exit and exit access doorway throughout the transport route. The signal shall be relayed to an approved central, proprietary or remote station service or constantly attended on-site location and shall initiate a local audible alarm.

[F] 415.5.3 Supervision. Emergency alarm systems required by Section 415.5.1 or 415.5.2 shall be electrically supervised and monitored by an approved central, proprietary or remote station service or shall initiate an audible and visual signal at a constantly attended on-site location.

[F] 415.5.4 Emergency alarm systems. *Emergency alarm systems* required by Section 415.5.1 or 415.5.2 shall be provided with emergency or standby power in accordance with Section 2702.2.

[S][F] 415.6 Fire separation distance. Group H occupancies shall be located on property in accordance with the other provisions of this chapter. In Groups H-2 and H-3, not less than 25 percent of the perimeter wall of the occupancy shall be an *exterior wall*.

Exceptions:

1. *Liquid use, dispensing and mixing rooms* having a floor area of not more than 500 square feet (46.5 m^2) need not be located on the outer perimeter of the building where they are in accordance with the *International Fire Code* and NFPA 30.
2. *Liquid storage rooms* having a floor area of not more than 1,000 square feet (93 m^2) need not be located on the outer perimeter where they are in accordance with the *International Fire Code* and NFPA 30.
3. Spray paint booths that comply with the *International Fire Code* need not be located on the outer perimeter.

[F] 415.6.1 Group H occupancy minimum fire separation distance. Regardless of any other provisions, buildings containing Group H occupancies shall be set back to the minimum *fire separation distance* as set forth in Sections 415.6.1.1 through 415.6.1.4. Distances shall be measured from the walls enclosing the occupancy to *lot lines*, including those on a public way. Distances to assumed *lot lines* established for the purpose of determining exterior wall and opening protection are not to be used to establish the minimum *fire separation distance* for buildings on sites where explosives are manufactured or used where separation is provided in accordance with the quantity distance tables specified for explosive materials in the *International Fire Code*.

[F] 415.6.1.1 Group H-1. Group H-1 occupancies shall be set back not less than 75 feet (22 860 mm) and not less than required by the *International Fire Code*.

((~~Exception:~~ ~~Fireworks manufacturing buildings separated in accordance with NFPA 1124.~~))

415.6.1.1.1 Restrictions in the Fire District. Group H-1 occupancies shall not be located in the *Fire District*.

[F] 415.6.1.2 Group H-2. Group H-2 occupancies shall be set back not less than 30 feet (9144 mm) where the area of the occupancy is greater than 1,000 square feet (93 m^2) and it is not required to be located in a *detached building*.

415.6.1.2.1 Restrictions in the Fire District. Group H-2 occupancies having a floor area in excess of 500 square feet (46 m^2) are not permitted in the *Fire District*. Group H-3 Occupancies having a floor area in excess of 1,500 square feet (139 m^2) are not permitted in the *Fire District*.

[F] 415.6.1.3 Groups H-2 and H-3. Group H-2 and H-3 occupancies shall be set back not less than 50 feet (15 240 mm) where a *detached building* is required (see Table 415.6.2).

[F] 415.8.3 Water reactives. Group H-2 and H-3 occupancies containing water-reactive materials shall be resistant to water penetration. Piping for conveying liquids shall not be over or through areas containing water reactives, unless isolated by *approved* liquid-tight construction.

Exception: Fire protection piping shall be permitted over or through areas containing water reactives without isolating it with liquid-tight construction.

[F] 415.8.4 Floors in storage rooms. Floors in storage areas for organic peroxides, oxidizers, pyrophoric materials, unstable (reactive) materials and water-reactive solids and liquids shall be of liquid-tight, noncombustible construction.

[F] 415.8.5 Waterproof room. Rooms or areas used for the storage of water-reactive solids and liquids shall be constructed in a manner that resists the penetration of water through the use of waterproof materials. Piping carrying water for other than *approved automatic sprinkler systems* shall not be within such rooms or areas.

[S][F] 415.9 Group H-2. Occupancies in Group H-2 shall be constructed in accordance with Sections 415.9.1 through 415.9.3 and the *International Fire Code*.

[F] 415.9.1 Flammable and combustible liquids. The storage, handling, processing and transporting of flammable and combustible liquids in Group H-2 and H-3 occupancies shall be in accordance with Sections 415.9.1.1 through 415.9.1.9, the *International Mechanical Code* and the *International Fire Code*.

[F] 415.9.1.1 Mixed occupancies. Where the storage tank area is located in a building of two or more occupancies and the quantity of liquid exceeds the maximum allowable quantity for one *control area*, the use shall be completely separated from adjacent occupancies in accordance with the requirements of Section 508.4.

[F] 415.9.1.1.1 Height exception. Where storage tanks are located within a building not more than one story above grade plane, the height limitation of Section 504 shall not apply for Group H.

[F] 415.9.1.2 Tank protection. Storage tanks shall be noncombustible and protected from physical damage. *Fire barriers* or *horizontal assemblies* or both around the storage tanks shall be permitted as the method of protection from physical damage.

[F] 415.9.1.3 Tanks. Storage tanks shall be *approved* tanks conforming to the requirements of the *International Fire Code.*

[F] 415.9.1.4 Leakage containment. A liquid-tight containment area compatible with the stored liquid shall be provided. The method of spill control, drainage control and secondary containment shall be in accordance with the *International Fire Code.*

Exception: Rooms where only double-wall storage tanks conforming to Section 415.9.1.3 are used to store Class I, II and IIIA flammable and combustible liquids shall not be required to have a leakage containment area.

[F] 415.9.1.5 Leakage alarm. An *approved* automatic alarm shall be provided to indicate a leak in a storage tank and room. The alarm shall sound an audible signal, 15 dBa above the ambient sound level, at every point of entry into the room in which the leaking storage tank is located. An *approved* sign shall be posted on every entry door to the tank storage room indicating the potential hazard of the interior room environment, or the sign shall state: WARNING, WHEN ALARM SOUNDS, THE ENVIRONMENT WITHIN THE ROOM MAY BE HAZARDOUS. The leakage alarm shall be supervised in accordance with Chapter 9 to transmit a trouble signal.

[F] 415.9.1.6 Tank vent. Storage tank vents for Class I, II or IIIA liquids shall terminate to the outdoor air in accordance with the *International Fire Code*.

[F] 415.9.1.7 Room ventilation. Storage tank areas storing Class I, II or IIIA liquids shall be provided with mechanical *ventilation*. The mechanical *ventilation* system shall be in accordance with the *International Mechanical Code* and the *International Fire Code*.

[F] 415.9.1.8 Explosion venting. Where Class I liquids are being stored, explosion venting shall be provided in accordance with the *International Fire Code*.

[F] 415.9.1.9 Tank openings other than vents. Tank openings other than vents from tanks inside buildings shall be designed to ensure that liquids or vapor concentrations are not released inside the building.

[F] 415.9.2 Liquefied petroleum gas facilities. The construction and installation of liquefied petroleum gas facilities shall be in accordance with the requirements of this code, the *International Fire Code*, the *International Mechanical Code*, the *International Fuel Gas Code* and NFPA 58.

[F] 415.9.3 Dry cleaning plants. The construction and installation of dry cleaning plants shall be in accordance with the requirements of this code, the *International Mechanical Code*, the ((~~*International*~~)) *Uniform Plumbing Code* and NFPA 32. Dry cleaning solvents and systems shall be classified in accordance with the *International Fire Code*.

[F] 415.10 Groups H-3 and H-4. Groups H-3 and H-4 shall be constructed in accordance with the applicable provisions of this code and the *International Fire Code*.

Two or more operations at a workstation shall not be connected to the same exhaust system where either one or the combination of the substances removed could constitute a fire, explosion or hazardous chemical reaction within the exhaust duct system.

Exhaust ducts penetrating *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711 shall be contained in a *shaft* of equivalent fire-resistance- rated construction. Exhaust ducts shall not penetrate *fire walls*.

Fire dampers shall not be installed in exhaust ducts.

[F] 415.11.1.7 Transporting hazardous production materials to fabrication areas. HPM shall be transported to *fabrication areas* through enclosed piping or tubing systems that comply with Section 415.11.6, through *service corridors* complying with Section 415.11.3, or in *corridors* as permitted in the exception to Section 415.11.2. The handling or transporting of HPM within *service corridors* shall comply with the *International Fire Code*.

[S][F] 415.11.1.8 Electrical. Electrical equipment and devices within the *fabrication area* shall comply with ((~~NFPA 70~~)) the *Seattle Electrical Code*. The requirements for hazardous locations need not be applied where the average air change is not less than four times that set forth in Section 415.11.1.6 and where the number of air changes at any location is not less than three times that required by Section 415.11.1.6. The use of recirculated air shall be permitted.

[F] 415.11.1.8.1 Workstations. Workstations shall not be energized without adequate exhaust *ventilation*. See Section 415.11.1.6 for workstation exhaust *ventilation* requirements.

[F] 415.11.2 Corridors. *Corridors* shall comply with Chapter 10 and shall be separated from *fabrication are*as as specified in Section 415.11.1.2. *Corridors* shall not contain HPM and shall not be used for transporting such materials except through closed piping systems as provided in Section 415.11.6.4.

Exception: Where existing *fabrication areas* are altered or modified, HPM is allowed to be transported in existing *corridors*, subject to the following conditions:

1. Nonproduction HPM is allowed to be transported in *corridors* if utilized for maintenance, lab work and testing.
2. Where existing *fabrication areas* are altered or modified, HPM is allowed to be transported in existing *corridors*, subject to the following conditions:
   - 2.1. Corridors. *Corridors* adjacent to the *fabrication area* where the alteration work is to be done shall comply with Section 1020 for a length determined as follows:
     - 2.1.1. The length of the common wall of the *corridor* and the *fabrication area*; and
     - 2.1.2. For the distance along the *corridor* to the point of entry of HPM into the *corridor* serving that *fabrication area*.
   - 2.2. *Emergency alarm system.* There shall be an emergency telephone system, a local manual alarm station or other *approved* alarm-initiating device within *corridors* at not more than 150-foot (45 720 mm) intervals and at each *exit* and doorway. The signal shall be relayed to an *approved* central, proprietary or remote station service or the emergency control station and shall initiate a local audible alarm.
   - 2.3. Pass-throughs. *Self-closing* doors having a *fire protection rating* of not less than 1 hour shall separate pass-throughs from existing *corridors.* Pass-throughs shall be constructed as required for the *corridors* and protected by an *approved automatic sprinkler system.*

[F] 415.11.3 Service corridors. *Service corridors* within a Group H-5 occupancy shall comply with Sections 415.11.3.1 through 415.11.3.4.

[F] 415.11.3.1 Use conditions. *Service corridors* shall be separated from *corridors* as required by Section 415.11.1.2. *Service corridors* shall not be used as a required *corridor*.

[F] 415.11.3.2 Mechanical ventilation. Service corridors shall be mechanically ventilated as required by Section 415.11.1.6 or at not less than six air changes per hour.

[F] 415.11.3.3 Means of egress. The distance of travel from any point in a *service corridor* to an *exit*, *exit access corridor* or door into a *fabrication area* shall be not greater than 75 feet (22 860 mm). Dead ends shall be not greater than 4 feet (1219 mm) in length. There shall be not less than two *exits*, and not more than one-half of the required *means of egress* shall require travel into a *fabrication area*. Doors from *service corridors* shall swing in the direction of egress travel and shall be *self-closing*.

[F] 415.11.3.4 Minimum width. The clear width of a *service corridor* shall be not less than 5 feet (1524 mm), or 33 inches (838 mm) wider than the widest cart or truck used in the *service corridor*, whichever is greater.

[F] 415.11.3.5 Emergency alarm system. *Emergency alarm systems* shall be provided in accordance with this section and Sections 415.5.1 and 415.5.2. The maximum allowable quantity per *control area* provisions shall not apply to *emergency alarm systems* required for HPM.

8. Exhaust *ventilation* flow alarm devices for pyrophoric liquids and Class 3 water-reactive liquids cabinet exhaust *ventilation* systems required in Section 2705.2.3.4 of the *International Fire Code*.

[F] 415.11.10 Emergency power system. An emergency power system shall be provided in Group H-5 occupancies in accordance with Section 2702. The emergency power system shall supply power automatically to the electrical systems specified in Section 415.11.10.1 when the normal electrical supply system is interrupted.

[S][F] 415.11.10.1 Required electrical systems. ((~~Emergency~~)) An *emergency* power *system* shall be provided for electrically operated equipment and connected control circuits for the following systems:

1. HPM exhaust *ventilation* systems.
2. HPM gas cabinet *ventilation* systems.
3. HPM exhausted enclosure *ventilation* systems.
4. HPM gas room *ventilation* systems.
5. HPM gas detection systems.
6. *Emergency alarm systems*.
7. Manual and automatic *fire alarm* systems.
8. *Automatic sprinkler system* monitoring and alarm systems.
9. Automatic alarm and detection systems for pyrophoric liquids and Class 3 water-reactive liquids required in Section 2705.2.3.4 of the *International Fire Code*.
10. Flow alarm switches for pyrophoric liquids and Class 3 water-reactive liquids cabinet exhaust *ventilation* systems required in Section 2705.2.3.4 of the *International Fire Code*.
11. Electrically operated systems required elsewhere in this code or in the *International Fire Code* applicable to the use, storage or handling of HPM.

[F] 415.11.10.2 Exhaust ventilation systems. Exhaust *ventilation* systems are allowed to be designed to operate at not less than one-half the normal fan speed on the emergency power system where it is demonstrated that the level of exhaust will maintain a safe atmosphere.

[F] 415.11.11 Automatic sprinkler system protection in exhaust ducts for HPM. An *approved automatic sprinkler system* shall be provided in exhaust ducts conveying gases, vapors, fumes, mists or dusts generated from HPM in accordance with Sections 415.11.11.1 through 415.11.11.3 and the *International Mechanical Code*.

[F] 415.11.11.1 Metallic and noncombustible nonmetallic exhaust ducts. An *approved automatic sprinkler system* shall be provided in metallic and noncombustible nonmetallic exhaust ducts where all of the following conditions apply:

1. Where the largest cross-sectional diameter is equal to or greater than 10 inches (254 mm).
2. The ducts are within the building.
3. The ducts are conveying flammable gases, vapors or fumes.

[F] 415.11.11.2 Combustible nonmetallic exhaust ducts. *Automatic sprinkler system* protection shall be provided in combustible nonmetallic exhaust ducts where the largest cross-sectional diameter of the duct is equal to or greater than 10 inches (254 mm).

Exception: Ducts need not be provided with automatic sprinkler protection as follows:

1. Ducts *listed* or *approved* for applications without *automatic sprinkler system* protection.
2. Ducts not more than 12 feet (3658 mm) in length installed below ceiling level.

[F] 415.11.11.3 Automatic sprinkler locations. Sprinkler systems shall be installed at 12-foot (3658 mm) intervals in horizontal ducts and at changes in direction. In vertical ducts, sprinklers shall be installed at the top and at alternate floor levels.

SECTION 416
SPRAY APPLICATION OF FLAMMABLE FINISHES

[F] 416.1 General. The provisions of this section shall apply to the construction, installation and use of buildings and structures, or parts thereof, for the spray application of flammable finishes. Operations and equipment shall comply with the *International Fire Code*.

[F] 416.2 Spray rooms. Spray rooms shall be enclosed with not less than 1-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. Floors shall be waterproofed and drained in an *approved* manner.

SECTION 419
LIVE/WORK UNITS

[S] 419.1 General. A *live/work unit* shall comply with Sections 419.1 through 419.9.

Exception: Dwelling or sleeping units that include an office that is less than 10 percent of the area of the *dwelling unit* are permitted to be classified as *dwelling units* with accessory occupancies in accordance with Section 508.2.

419.1.1 Limitations. All of the following shall apply to live/work areas:

1. The *live/work unit* is permitted to be not greater than 3,000 square feet (279 m^2) in area.
2. The nonresidential area is permitted to be not more than 50 percent of the area of each *live/work unit*.

((~~3. The nonresidential area function shall be limited to the first or main floor only of the *live/work unit*.~~

~~4. Not more than five nonresidential workers or employees are allowed to occupy the nonresidential area at any one time.~~))

[S] 419.2 Occupancies. *Live/work units* shall be classified as a Group R-2 or Group R-3 occupancy. Separation requirements found in ((~~Sections 420 and~~)) Section 508 shall not apply within the *live/work unit* where the *live/work unit* is in compliance with Sections 419 and 420. Nonresidential uses that would otherwise be classified as either a Group H or S occupancy shall not be permitted in a *live/work unit*.

Exception: Storage shall be permitted in the *live/work unit* provided that the aggregate area of storage in the nonresidential portion of the *live/work unit* shall be limited to 10 percent of the space dedicated to nonresidential activities.

419.3 Means of egress. Except as modified by this section, the *means of egress* components for a *live/work unit* shall be designed in accordance with Chapter 10 for the function served.

419.3.1 Egress capacity. The egress capacity for each element of the *live/work unit* shall be based on the occupant load for the function served in accordance with Table 1004.5.

419.3.2 Spiral stairways. *Spiral stairways* that conform to the requirements of Section 1011.10 shall be permitted.

419.4 Vertical openings. Floor openings between floor levels of a *live/work unit* are permitted without enclosure.

[F] 419.5 Fire protection. The *live/work unit* shall be provided with a monitored *fire alarm* system where required by Section 907.2.9. ((~~and an~~)) An *automatic sprinkler system* shall be provided in the *live/work unit* in accordance with:

1. Section ((~~903.2.8.~~)) 903.3.1.2 or 903.3.1.3 for Group R occupancies in buildings with four or fewer *dwelling units* that do not exceed two *stories* in height that are less than 5,000 square feet in area; or
2. Section 903.3.1.1 for all other buildings.

[S] 419.6 Structural. Floors within a *live/work unit* shall be designed for the live loads in Table 1607.1, based on the function within the space. The nonresidential portion of the unit shall be designed for a live load of not less than 50 psf.

419.7 Accessibility. Accessibility shall be designed in accordance with Chapter 11 for the function served.

Interpretation I419.7: Accessibility provisions for Group M occupancies shall be applied unless the applicant specifies another occupancy.

419.8 Ventilation. The applicable *ventilation* requirements of the *International Mechanical Code* shall apply to each area within the *live/work unit* for the function within that space.

419.9 Plumbing facilities. The nonresidential area of the *live/work unit* shall be provided with minimum plumbing facilities as specified by Chapter 29, based on the function of the nonresidential area. Where the nonresidential area of the *live/work unit* is required to be *accessible* by Section 1107.6.2.1, the plumbing fixtures specified by Chapter 29 shall be *accessible*.

SECTION 420
GROUPS I-1, R-1, R-2, R-3 AND R-4

[S] 420.1 General. Occupancies in Groups I-1, R-1, R-2, R-3 and R-4 shall comply with the provisions of Sections 420.1 through ((~~420.10~~)) 420.14 and other applicable provisions of this code.

[W] 420.2 Separation walls. Walls separating *dwelling units* in the same building, walls separating *sleeping units* in the same building and walls separating *dwelling* or *sleeping units* from other occupancies contiguous to them in the same building shall be constructed as *fire partitions* in accordance with Section 708. Buildings containing multiple sleeping units with common use or central kitchens shall not be classified as a single dwelling.

Exceptions:

1. Groups R-2 and I-1 arranged into residential sleeping suites containing a maximum of five sleeping residents. Separation between bedrooms, living areas and toilet rooms within these residential sleeping suites shall not be required.
2. Group I-1 sleeping areas arranged so that a dedicated staff member has direct observation over a multiple resident sleeping room, without intervening full height walls, shall not be required to provide fire partitions within the resident sleeping area.

Interpretation I420: Separation provisions of Section 508 apply in addition to the separation requirements of Section 420.

[S] 420.3 Horizontal separation. Floor assemblies separating *dwelling units* in the same buildings, floor assemblies separating *sleeping units* in the same building and floor assemblies separating *dwelling* or *sleeping units* from other occupancies contiguous to them in the same building shall be constructed as *horizontal assemblies* in accordance with Section 711.

Exception: In Group R-3 ((~~and R-4~~)) facilities, floor assemblies within the dwelling units or sleeping units are not required to be constructed as horizontal assemblies.

[F] 420.4 Automatic sprinkler system. Group R occupancies shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.2.8. Group I-1 occupancies shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.2.6. Quick-response or residential automatic sprinklers shall be installed in accordance with Section 903.3.2.

[F] 420.5 Fire alarm systems and smoke alarms. Fire alarm systems and smoke alarms shall be provided in Group I-1, R-1 and R-2 occupancies in accordance with Sections 907.2.6, 907.2.8 and 907.2.9, respectively. Single- or multiple-station smoke alarms shall be provided in Groups I-1, R-2, R-3 and R-4 in accordance with Section 907.2.10.

420.6 Smoke barriers in Group I-1, Condition 2. Smoke barriers shall be provided in Group I-1, Condition 2 to subdivide every story used by persons receiving care, treatment or sleeping and to provide other stories with an occupant load of 50 or more persons, into not fewer than two smoke compartments. Such stories shall be divided into smoke compartments with an area of not more than 22,500 square feet (2092 m^2) and the distance of travel from any point in a smoke compartment to a smoke barrier door shall not exceed 200 feet (60 960 mm). The smoke barrier shall be in accordance with Section 709.

420.6.1 Refuge area. Refuge areas shall be provided within each smoke compartment. The size of the refuge area shall accommodate the occupants and care recipients from the adjoining smoke compartment. Where a smoke compartment is adjoined by two or more smoke compartments, the minimum area of the refuge area shall accommodate the largest occupant load of the adjoining compartments. The size of the refuge area shall provide the following:

1. Not less than 15 net square feet (1.4 m^2) for each care recipient.
2. Not less than 6 net square feet (0.56 m^2) for other occupants.

Areas or spaces permitted to be included in the calculation of the refuge area are corridors, lounge or dining areas and other low-hazard areas.

420.7 Group I-1 assisted living housing units. In Group I-1 occupancies, where a fire-resistance corridor is provided in areas where assisted living residents are housed, shared living spaces, group meeting or multipurpose therapeutic spaces open to the corridor shall be in accordance with all of the following criteria:

1. The walls and ceilings of the space are constructed as required for corridors.
2. The spaces are not occupied as resident sleeping rooms, treatment rooms, incidental uses in accordance with Section 509, or hazardous uses.
3. The open space is protected by an automatic fire detection system installed in accordance with Section 907.
4. In Group I-1, Condition 1, the corridors onto which the spaces open are protected by an automatic fire detection system installed in accordance with Section 907, or the spaces are equipped throughout with quick-response sprinklers in accordance with Section 903.3.2.
5. In Group I-1, Condition 2, the corridors onto which the spaces open, in the same smoke compartment, are protected by an automatic fire detection system installed in accordance with Section 907, or the smoke compartment in which the spaces are located is equipped throughout with quick-response sprinklers in accordance with Section 903.3.2.
6. The space is arranged so as not to obstruct access to the required exits.

420.8 Group I-1 cooking facilities. In Group I-1 occupancies, rooms or spaces that contain cooking facilities with domestic cooking appliances shall be in accordance with all of the following criteria:

1. In Group I-1, Condition 1 occupancies, the number of care recipients served by one cooking facility shall not be greater than 30.

2. In Group I-1, Condition 2 occupancies, the number of care recipients served by one cooking facility and within the same smoke compartment shall not be greater than 30.
3. The types of domestic cooking appliances permitted shall be limited to ovens, cooktops, ranges, warmers and microwaves.
4. The space containing the domestic cooking facilities shall be arranged so as not to obstruct access to the required exit.
5. Domestic cooking hoods installed and constructed in accordance with Section 505 of the *International Mechanical Code* shall be provided over cooktops or ranges.
6. Cooktops and ranges shall be protected in accordance with Section 904.13.
7. A shutoff for the fuel and electrical supply to the cooking equipment shall be provided in a location that is accessible only to staff.
8. A timer shall be provided that automatically deactivates the cooking appliances within a period of not more than 120 minutes.
9. A portable fire extinguisher shall be provided. Installation shall be in accordance with Section 906 and the extinguisher shall be located within a 30-foot (9144 mm) distance of travel from each domestic cooking appliance.

420.8.1 Cooking facilities open to the corridor. Cooking facilities located in a room or space open to a corridor, aisle or common space shall comply with Section 420.8.

420.9 Group R cooking facilities. In Group R occupancies, cooking appliances used for domestic cooking operations shall be in accordance with Section 917.2 of the *International Mechanical Code*.

420.10 Group R-2 dormitory cooking facilities. Domestic cooking appliances for use by residents of Group R-2 college dormitories shall be in accordance with Sections 420.10.1 and 420.10.2.

420.10.1 Cooking appliances. Where located in Group R-2 college dormitories, domestic cooking appliances for use by residents shall be in compliance with all of the following:

1. The types of domestic cooking appliances shall be limited to ovens, cooktops, ranges, warmers, coffee makers and microwaves.
2. Domestic cooking appliances shall be limited to approved locations.
3. Cooktops and ranges shall be protected in accordance with Section 904.13.
4. Cooktops and ranges shall be provided with a domestic cooking hood installed and constructed in accordance with Section 505 of the *International Mechanical Code*.

420.10.2 Cooking appliances in sleeping rooms. Cooktops, ranges and ovens shall not be installed or used in sleeping rooms.

[W] 420.11 Adult family homes. This section shall apply to all newly constructed adult family homes and all existing single-family homes being converted to adult family homes. This section shall not apply to those adult family homes licensed by the state of Washington department of social and health services prior to July 1, 2001.

420.11.1 Sleeping room classification. Each sleeping room in an adult family home shall be classified as one of the following:

1. Type S - Where the means of egress contains stairs, elevators or platform lifts.
2. Type NS1 - Where one means of egress is at grade level or a ramp constructed in accordance with Section 1012 is provided.
3. Type NS2 - Where two means of egress are at grade level or ramps constructed in accordance with Section 1012 are provided.

420.11.2 Types of locking devices and door activation. All bedrooms and bathroom doors shall be openable from the outside when locked. Every closet door shall be readily openable from the inside. Operable parts of door handles, pulls, latches, locks and other devices installed in adult family homes shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. Pocket doors shall have graspable hardware available when in the closed or open position.

The force required to activate operable parts shall be 5.0 pounds (22.2 N) maximum. Required exit door(s) shall have no additional locking devices. Required exit door hardware shall unlock inside and out-side mechanisms when exiting the building allowing reentry into the adult family home without the use of a key, tool or special knowledge.

420.11.3 Smoke and carbon monoxide alarm requirements. Alarms shall be installed in such a manner so that the detection device warning is audible from all areas of the dwelling upon activation of a single alarm.

420.11.4 Escape windows and doors. Every sleeping room shall be provided with emergency escape and rescue windows as required by Section 1030. No alternatives to the sill height such as steps, raised platforms or other devices placed by the openings will be approved as meeting this requirement.

420.11.5 Grab bar general requirements. Where facilities are designated for use by adult family home clients, grab bars for water closets, bathtubs and shower stalls shall be installed according to ICC A117.1.

420.11.6 Shower stalls. Where provided to meet the requirements for bathing facilities, the minimum size of shower stalls for an adult family home shall be 30 inches deep by 48 inches long.

[W] 420.12 Licensed care cooking facilities. In Group I-1, Condition 2 assisted living facilities licensed under chapter 388-78A WAC and residential treatment facilities licensed under chapter 246-337 WAC, rooms or spaces that contain a cooking facility with domestic cooking appliances shall be permitted to be open to the corridor where all of the following criteria are met:

1. The number of care recipients housed in the smoke compartment is not greater than 30.
2. The number of care recipients served by the cooking facility is not greater than 30.
3. Only one cooking facility area is permitted in a smoke compartment.
4. The types of domestic cooking appliances permitted are limited to ovens, cooktops, ranges, warmers and microwaves.
5. The corridor is a clearly identified space delineated by construction or floor pattern, material or color.
6. The space containing the domestic cooking facility shall be arranged so as not to obstruct access to the required exit.
7. A domestic cooking hood installed and constructed in accordance with Section 505 of the International Mechanical Code is provided over the cooktop or range.
8. The domestic cooking hood provided over the cooktop or range shall be equipped with an automatic fire-extinguishing system of a type recognized for protection of domestic cooking equipment. Pre-engineered automatic extinguishing systems shall be tested in accordance with UL 300A and listed and labeled for the intended application. The system shall be installed in accordance with this code, its listing and the manufacturer's instructions.
9. A manual actuation device for the hood suppression system shall be installed in accordance with Sections 904.12.1 and 904.12.2.
10. An interlock device shall be provided such that upon activation of the hood suppression system, the power or fuel supply to the cooktop or range will be turned off.
11. A shut-off for the fuel and electrical power supply to the cooking equipment shall be provided in a location that is accessible only to staff.
12. A timer shall be provided that automatically deactivates the cooking appliances within a period of not more than 120 minutes.
13. A portable fire extinguisher shall be installed in accordance with Section 906 of the International Fire Code.

[S] 420.13 Roof-ceiling soffits. Roof-ceiling soffits in *dwelling units* and sleeping units shall be provided with a minimum of 1/2-inch (13 mm) gypsum wallboard in buildings of Types IIB, IIIB and VB construction.

[S] 420.14 Security from criminal activity in Group R.

420.14.1 Group R occupancies other than one- and two-family dwellings. All housing units except one- and two-family *dwellings* shall comply with Section 420.14.1.

420.14.1.1 Definition. For the purposes of this section, "housing unit" is any *dwelling unit* or guest room.

420.14.1.2 Building entrance doors and locks. Building entrance doors shall be without openings and shall be as capable of resisting forcible entry as a flush solid core wood door 1-3/8 inches (35 mm) thick.

Exceptions:

1. Building entrance doors are permitted to have visitor-observation ports that do not impair the fire resistance of the door.
2. Main entrance doors are permitted to be framed or unframed non-shattering glass, framed 1/4-inch (6 mm) plate glass or other security glazing.
3. Building entrance doors other than main entrance doors are permitted to have glazed openings. Glazed openings shall have wire, grilles or security glazing to prevent operation of the door latch from outside by hand or instrument.

Building entrance doors shall be self-closing, self-locking and equipped with a dead-locking latch bolt with at least a 1/2-inch (13 mm) throw that shall penetrate the striker at least 1/4 inch (6 mm).

Exceptions:

1. Building entrance doors that open directly into a housing unit shall comply with Section 420.14.1.4.
2. Garage-to-building doors need not be self-locking when the garage-to-exterior door is equipped with an electrically-operated remote control device for opening and automatically closing.

3. When either the garage-to-exterior doors or garage-to-building doors are equipped for self-closing and self-locking, the other need not be so equipped.

420.14.1.3 Locks. All *exit* doors, including those from individual housing units, shall be openable from the interior without use of keys or special knowledge or effort.

420.14.1.4 Housing unit doors and locks. Doors from interior *corridors* to individual housing units shall not have glass openings and shall be as capable of resisting forcible entry as a flush solid core wood door 1-3/8 (35 mm) inches thick.

Every entrance door to a housing unit shall have a dead bolt or dead-locking latch bolt with at least a 1/2-inch (13 mm) throw that penetrates the striker not less than 1/4 inch (6 mm). In hotels and other multi-unit buildings that provide housing for rent on a daily or weekly basis, every entrance door to a housing unit shall also be provided with a chain door guard or barrel bolt on the inside.

420.14.1.5 Observation ports. Every entrance door to a housing unit, other than transparent doors, shall have a visitor-observation port. The port shall not impair the fire resistance of the door. Observation ports shall be installed not less than 54 inches (1372 mm) and not more than 66 inches (1676 mm) above the floor.

420.14.1.6 Non-exit doors. Doors to storage, maintenance and building service rooms shall be self-closing and self-locking.

420.14.1.7 Sliding doors. Dead bolts or other *approved* locking devices shall be provided on all sliding doors. These locks shall be installed so that the mounting screws for the lock cases are inaccessible from the outside.

420.14.1.8 Windows. Openable windows shall have operable inside latching devices.

Exception: Windows with sills located 10 feet (3048 mm) or more above grade, or 10 feet (3048 mm) or more above a deck, balcony or porch that is not readily accessible from grade except through a housing unit need not have operable inside latching devices.

420.14.2 One- and two-family dwellings. One- and two-family *dwellings* shall comply with Section 420.14.2.

420.14.2.1 Building entrance locks. Building entrance doors, including garage doors, shall be capable of locking. They shall be equipped with a dead-locking latch bolt with at least a 1/2-inch (13 mm) throw that penetrates the striker not less than 1/4 inch (6 mm). Building entrance doors shall be openable from the inside without use of a key or special knowledge or effort.

Exception: Garage-to-exterior doors are permitted to be equipped with an electronically-operated remote control device for opening and closing in lieu of a dead-locking latch bolt. When garage-to-exterior doors are equipped with remote control devices, garage-to-building doors need not be capable of locking.

420.14.2.2 Observation ports. Every building entrance door, other than garage doors, shall have a visitor observation port or glass side light. Observation ports shall be installed at a height of not less than 54 inches (1372 mm) and not more than 66 inches (1676 mm) from the floor.

420.14.2.3 Windows and sliding doors. Dead bolts or other *approved* locking devices shall be provided on all sliding doors and openable windows. The lock shall be installed so that the mounting screws for the lock case are inaccessible from the outside.

Exception: Windows with sills located 10 feet (3048 mm) or more above grade, or 10 feet (3048 mm) or more above a deck, balcony or porch that is not readily accessible from grade except through a housing unit need not have operable inside latching devices.

420.14.3 Alternate security devices. Subject to the approval of the *building official*, alternate security devices are permitted to be substituted for those required by this Section 420.14. Alternate devices shall have equal capability to resist illegal entry. The installation of the device shall not conflict with other requirements of this code and other ordinances regulating the safety of exiting.

SECTION 421
HYDROGEN FUEL GAS ROOMS

[F] 421.1 General. Where required by the *International Fire Code*, hydrogen fuel gas rooms shall be designed and constructed in accordance with Sections 421.1 through 421.7.

[F] 421.2 Location. Hydrogen fuel gas rooms shall not be located below grade.

[F] 421.3 Design and construction. Hydrogen fuel gas rooms not classified as Group H shall be separated from other areas of the building in accordance with Section 509.1.

[F] 421.3.1 Pressure control. Hydrogen fuel gas rooms shall be provided with a ventilation system designed to maintain the room at a negative pressure in relation to surrounding rooms and spaces.

[F] 421.3.2 Windows. Operable windows in interior walls shall not be permitted. Fixed windows shall be permitted where in accordance with Section 716.

[F] 421.4 Exhaust ventilation. Hydrogen fuel gas rooms shall be provided with mechanical exhaust ventilation in accordance with the applicable provisions of Section 502.16.1 of the *International Mechanical Code*.

[F] 421.5 Gas detection system. Hydrogen fuel gas rooms shall be provided with a *gas detection system* that complies with Sections 421.5.1, 421.5.2, and 916.

[F] 421.5.1 System activation. Activation of a gas detection alarm shall result in both of the following:

1. Initiation of distinct audible and visible alarm signals both inside and outside of the hydrogen fuel gas room.
2. Automatic activation of the mechanical exhaust ventilation system.

[F] 421.5.2 Failure of the gas detection system. Failure of the *gas detection system* shall automatically activate the mechanical exhaust ventilation system, stop hydrogen generation, and cause a trouble signal to sound at an approved location.

[F] 421.6 Explosion control. Explosion control shall be provided where required by Section 414.5.1.

[S][F] 421.7 ((~~Standby~~)) Legally required standby power. Mechanical *ventilation* and gas detection systems shall be provided with a standby power system in accordance with Section 2702.

SECTION 422
AMBULATORY CARE FACIILITIES

422.1 General. Occupancies classified as *ambulatory care facilities* shall comply with the provisions of Sections 422.1 through 422.6 and other applicable provisions of this code.

422.2 Separation. *Ambulatory care facilities* where the potential for four or more care recipients are to be *incapable of self-preservation* at any time shall be separated from adjacent spaces, *corridors* or tenants with a *fire partition* installed in accordance with Section 708.

[S] 422.3 Smoke compartments. Where the aggregate area of one or more *ambulatory care facilities* is greater than 10,000 square feet (929 m^2) on one *story*, the *story* shall be provided with a *smoke barrier* to subdivide the *story* into not fewer than two *smoke compartments*. The area of any one such *smoke compartment* shall be not greater than 22,500 square feet (2090 m^2). The distance of travel from any point in a *smoke compartment* to a *smoke barrier* door shall be not greater than 200 feet (60 960 mm). The *smoke barrier* shall be installed in accordance with Section 709 with the exception that *smoke barriers* shall be continuous from outside wall to an outside wall, a floor to a floor, or from a *smoke barrier* to a *smoke barrier* or a combination thereof.

422.3.1 Means of egress. Where ambulatory care facilities require smoke compartmentation in accordance with Section 422.3, the fire safety evacuation plans provided in accordance with Section 1002.2 shall identify the building components necessary to support a *defend-in-place* emergency response in accordance with Sections 403 and 404 of the *International Fire Code.*

422.3.2 Refuge area. Not less than 30 net square feet (2.8 m^2) for each nonambulatory care recipient shall be provided within the aggregate area of *corridors*, care recipient rooms, treatment rooms, lounge or dining areas and other low-hazard areas within each *smoke compartment.* Each occupant of an *ambulatory care facility* shall be provided with access to a refuge area without passing through or utilizing adjacent tenant spaces.

422.3.3 Independent egress. A *means of egress* shall be provided from each *smoke compartment* created by smoke barriers without having to return through the *smoke compartment* from which *means of egress* originated.

[F] 422.4 Automatic sprinkler systems. *Automatic sprinkler systems* shall be provided for *ambulatory care facilities* in accordance with Section 903.2.2.

[F] 422.5 Fire alarm systems. A *fire alarm* system shall be provided for *ambulatory care facilities* in accordance with Section 907.2.2.

[F] 422.6 Electrical systems. In ambulatory care facilities, the essential electrical system for electrical components, equipment and systems shall be designed and constructed in accordance with the provisions of Chapter 27 and NFPA 99.

SECTION 423
STORM SHELTERS

423.1 General. This section applies to the construction of storm shelters constructed as separate detached buildings or constructed as rooms or spaces within buildings for the purpose of providing protection from storms that produce high winds, such as tornadoes and hurricanes during the storm. Such structures shall be designated to be hurricane shelters, tornado shelters, or combined hurricane and tornado shelters. Design of facilities for use as emergency shelters after the storm are outside the scope of ICC 500 and shall comply with Table 1604.5 as a Risk Category IV Structure.

SECTION 427
MEDICAL GAS SYSTEMS

[S][F] 427.1 General. Medical gases at health care-related facilities intended for patient ((~~or veterinary~~)) care, inhalation or sedation, including but not limited to, analgesia systems for dentistry, podiatry, veterinary and similar uses shall comply with Sections 427.2 through 427.2.3 in addition to other requirements of this code and Chapter 53 of the *International Fire Code*.

[S][F] 427.2 Interior supply location. Medical gases shall be ((~~located~~)) stored in areas dedicated to the storage of such gases without other storage or uses. Where containers of medical gases in quantities greater than the permitted amount are located inside the buildings, they shall be located in a 1-hour exterior room, 1-hour interior room or a gas cabinet in accordance with Section 427.2.1, 427.2.2 or 427.2.3, respectively. Rooms or areas where medical gases are stored or used in quantities exceeding the maximum allowable quantity per control area as set forth in ((~~Tables 307.1(1) and 307.1(2)~~)) *International Fire Code* Section 5003.1 shall ((~~be in accordance~~)) comply with the requirements for Group H occupancies.

[F] 427.2.1 One-hour exterior room. A 1-hour exterior room shall be a room or enclosure separated from the remainder of the building by fire barriers constructed in accordance with Section 707 or horizontal assemblies constructed in accordance with Section 711, or both, with a fire-resistance rating of not less than 1 hour. Openings between the room or enclosure and interior spaces shall be provided with self-closing smoke- and draft-control assemblies having a fire protection rating of not less than 1 hour. Rooms shall have not less than one exterior wall that is provided with not less than two vents. Each vent shall have a minimum free ((~~air~~)) opening area of ((~~not less than 36~~)) 24 square inches (((~~232~~)) 155 cm^2) for each 1,000 cubic feet (28 m^3) at normal temperature and pressure (NTP) of gas stored in the room and shall be not less than 72 square inches (465 cm^2) in aggregate free opening area. One vent shall be within 6 inches (152 mm) of the floor and one shall be within 6 inches (152 mm) of the ceiling. Rooms shall be provided with not fewer than one automatic fire sprinkler to provide container cooling in case of fire.

[F] 427.2.2 One-hour interior room. Where an exterior wall cannot be provided for the room, ((~~a 1-hour interior room or enclosure shall be provided and separated from the remainder of the building by fire barriers constructed in accordance with Section 707 or horizontal assemblies constructed in accordance with Section 711, or both, with a fire-resistance rating of not less than 1 hour.~~)) Openings between the room or enclosure and interior spaces shall be provided with self-closing ((~~smoke- and draft-control~~)) assemblies. ((~~having a fire protection rating of not less than 1 hour. An automatic~~)) Automatic sprinklers ((~~system~~)) shall be installed within the room. The room shall be exhausted through a duct to the exterior. Supply and exhaust ducts shall be enclosed in a 1-hour rated ((~~shaft~~)) enclosure from the room to the exterior. Approved mechanical ventilation shall comply with the *International Mechanical Code* and be provided with a minimum rate of 1 cubic foot per minute per square foot (0.00508 $m^3/s/m^2$) of the area of the room.

Exception: A 1-hour rated enclosure to the exterior is not required where the building is equipped with an automatic sprinkler system throughout.

[F] 427.2.3 Gas cabinets. Gas cabinets shall be constructed in accordance with Section 5003.8.6 of the *International Fire Code* and shall comply with the following:

((~~1. Cabinets shall be exhausted to the exterior through a dedicated exhaust duct system installed in accordance with Chapter 5 of the *International Mechanical Code*.~~

~~2~~)) 1. ((~~Supply and exhaust ducts shall be enclosed in a 1-hour rated shaft enclosure from the cabinet to the exterior.~~)) The average velocity of ventilation at the face of access ports or windows shall be not less than 200 feet per minute (1.02 m/s) with a minimum of 150 feet per minute (0.76 m/s) at any point of the access port or window.

2. They shall be connected to an exhaust system.

3. Cabinets shall be provided with an automatic sprinkler system internal to the cabinet.

[S] 427.3 Exterior supply locations. Oxidizer medical gas systems located on the exterior of a building with quantities greater than the permit amount shall be located in accordance with *International Fire Code* Section 6304.2.1.

SECTION 428
HIGHER EDUCATION LABORATORIES

[F] 428.1 Scope. *Higher education laboratories* complying with the requirements of Sections 428.1 through 428.4 shall be permitted to exceed the maximum allowable quantities of hazardous materials in control areas set forth in Tables 307.1(1) and 307.1(2) without requiring classification as a Group H occupancy. Except as specified in Section 428, such laboratories shall comply with all applicable provisions of this code and the *International Fire Code*.

[F] 428.2 Application. The provisions of Section 428 shall be applied as exceptions or additions to applicable requirements of this code. Unless specifically modified by Section 428, the storage, use and handling of hazardous materials shall comply with all other provisions in Chapters 38 and 50 through 67 of the *International Fire Code* and this code for quantities not exceeding the maximum allowable quantity.

[S] SECTION 429
WATERFRONT STRUCTURES: PIERS, WHARVES AND BUILDINGS

429.1 Scope. Structures with at least 20 percent or 8,000 square feet (743 m^2), whichever is greater, of their area over water shall comply with Section 429. They shall also comply with all other requirements of this code unless otherwise specified in Section 429. Unless otherwise specified, all wood dimensions are nominal size as defined in Section 202.

Exceptions:

1. Fire-resistance-rated walls specified in Section 429.6.6 are permitted to be used as one-hour fire-resistance-rated fire barriers and as a separation between *repair garages* not classified as Group S-1 and occupancies in Group A, including the specified opening protection in buildings of Types IIB, IV and VB construction.
2. Structures accessory to Group R-3 occupancies.
3. Floating homes that comply with the Seattle Residential Code.

See Chapter 36 of the Fire Code for additional requirements for fire protection systems for *marinas*.

429.2 Allowable area and height for waterfront structures. The height of structures to be built over water shall be measured as provided in Title 23 of the Seattle Municipal Code, Sections 23.60A.952 and 23.60A.930 for Shoreline Districts. Height and area shall comply with the requirements of Chapter 5, except that the increases allowed in Section 507 are not applicable to waterfront structures.

Exceptions:

1. In *covered boat moorages*, the areas in Table 506.2 are permitted to be increased not more than 400 percent when an *approved automatic sprinkler system* is provided throughout.
2. Each covered area of a boat moorage is permitted to be considered a separate building subject to the following conditions:
   - 2.1. Maximum individual areas shall be 8,000 square feet (743 m^2). The maximum width of connecting walkways shall be 10 feet (3048 mm).
   - 2.2. Walkways, finger *piers* and other decked areas shall not exceed 30 percent of the area of the roof that extends over water.
   - 2.3. Covered areas shall be separated by not less than 16 feet (4877 mm). The intervening areas are permitted to be used for moorage provided the adjacent covered areas comply with Item 2.4 below.
   - 2.4. Covered roof areas constructed in a manner that would trap smoke or hot gases shall be provided with the following:
     - 2.4.1 Vents or monitors of not less than 5 percent of the roof area.
     - 2.4.2 A draft stop of splined or tongue-and-groove planking not less than 1 inch (25 mm) in thickness, 1/2-inch (13 mm) exterior-type plywood or 26 gauge steel shall extend across the end of each roof area when the roof is closer than 30 feet (9144 mm) to an adjacent building. The draft stop shall extend to not less than 24 inches (610 mm) below the lower edge of the roof. A draft stop constructed in accordance with Section 429.5.2 shall be provided under the walkway at each location where draft stops are required at the end of roofed areas.

429.3 Accessory uses. Uses accessory to the principal occupancy shall be permitted, provided they are conducted in an area separated from the moorage area by not less than 16 feet (4877 mm) and the exposed side of the moorage area is protected by a one-hour fire-resistance-rated fire barrier extending 2-1/2 feet (762 mm) above the roof line. One-*story superstructures* shall be permitted for accessory uses but shall not exceed 1,000 square feet (93 m^2) in area nor 20 feet (6096 mm) in height.

Exception: Storage is allowed in the moorage area, provided it conforms to the following:

1. One unprotected moorage equipment locker of not more than 150 cubic feet (115 m^3) is permitted for each *slip*.
2. Where groups of three or more lockers are provided, they shall be separated from each other with one-hour fire-resistance-rated fire partitions, and openings in the separation shall have one-hour protection.
3. Storage of flammable liquids shall be in accordance with NFPA 31 and the Fire Code.

429.4 Location on property. Exterior walls shall have fire resistance and opening protection as determined by Section 705.

Exceptions:

1. Fire resistance-rated construction and opening protection required because of proximity to property lines are permitted to be omitted for waterfront structures that are located on the same property, separated by an unobstructed deck not less than 16 feet (4877 mm) wide, and have a draft stop constructed according to Section 429.4.2 installed in the *substructure* between the buildings.

2. In *covered boat moorages*, exterior walls that are built entirely over water are permitted to be of tongue-and-groove or splined planks not less than 2 inches (51 mm) in thickness, covered with 26 gauge sheet metal, 3/8-inch (9.5 mm) exterior type plywood or equivalent on both sides, regardless of proximity to property lines. Walls at the *substructure* are permitted to be constructed as specified in Section 429.5.2 for draft stops. Where such walls (even though part of such *covered boat moorage*) are built on land, this exception shall not apply.

429.5 Substructure.

429.5.1 Construction. *Substructures* are permitted to be of any type of construction permitted in this code subject to the area limitations of Section 429.2, except that, when constructed of wood, the members shall not be less than the following in any dimension, exclusive of piling:

MEMBER	SIZE UNLIMITED USE × 25.4 FOR MM	PIERS FOR BOAT MOORAGE ONLY, NOT EXCEEDING 10 FEET (3048 MM) IN WIDTH ´ 25.4 FOR MM
Caps and girders	8"	6"
Joists, beams and other members	4"	3"
Flooring or deck	3" T & G or splined or 4" square edged	2"
Bracing	3"	2"

For SI: 1 inch = 25.4 mm

429.5.1.1 Flooring for covered piers. If the flooring or deck is under a roof or is used for parking, there shall be applied over the flooring or deck a tight-fitting wearing surface of softwood not less than 2 inches (51 mm) thick and not more than 6 inches (152 mm) wide, 1-inch (25 mm) thick hardwood, 2-inch (51 mm) thick asphaltic concrete or other material of equivalent fire resistance.

Exception: Covered *piers* used for moorage only need not have a wearing surface.

429.5.2 Draft stops. Draft stops shall be installed in all *substructures* constructed of combustible materials, exclusive of piling and pile bracing. They shall be placed not more than 100 feet (2540 mm) apart measured along the main axis of the *pier* or *wharf*. They shall fit tightly around all joists, beams, etc., and extend from the underside of the deck to city datum if over salt water or to low water if over fresh water. See Section 429.6.7 for draft stops in *superstructures*.

Substructure draft stops shall be constructed of at least two layers of lumber not less than 2 inches (51 mm) in thickness laid with broken joints or materials of equal fire resistance.

429.6 Superstructure.

429.6.1 Construction. *Superstructures* are permitted to be of any type of construction permitted by this code subject to the height and area limitations of Section 429.2 and the requirements of this section.

429.6.2 Floors. See Section 429.6.

429.6.3 Exterior walls. Exterior walls of Types IIA, IIB, III, IV and V buildings, when not subject to the requirements of Section 429.5 because of their proximity to property lines, are permitted to be constructed of matched or lapped lumber not less than 2 inches (51 mm) thick and not more than 6 inches (153 mm) wide, or not less than 1 inch (25 mm) thick with a weather covering of noncombustible material applied directly to the wood. Fireblocking is an assembly having a three-fourths-hour fire- protection rating when fire-resistive openings are required by Sections 705 and 1028.

429.6.4 Roof coverings. Roof coverings shall be fire-retardant as specified in Chapter 15.

429.6.5 Roof construction. In Type IV buildings the roof is permitted to be constructed of corrugated galvanized steel attached directly to wood or steel purlins in lieu of that specified in Section 602.4.

429.6.6 Fire-resistance-rated walls. In Types IIA, IIB, III, IV and V buildings, there shall be at least one fire-resistance-rated wall from the deck to at least 3 feet (914 mm) above the roof for each 500 feet (152 m) of length. Areas greater than l00,000 square feet (9290 m^2) shall be divided with such fire-resistance-rated walls. There shall be a draft stop constructed as specified in Section 429.6.2, installed in the *substructure* immediately below every required fire-resistance-rated wall when the deck is of combustible materials.

Fire-resistance-rated walls shall be constructed as required for two-hour fire-resistance-rated walls or are permitted to consist of at least two layers of tongue-and-groove or splined lumber, not less than 2 inches (51 mm) thick and not more than 6 inches (153 mm) wide, with a sheet of not less than No. 26 gauge galvanized steel or 3/8-inch (3.2 mm) exterior type plywood between the two layers, placed vertically with broken joints, or equivalent fire-resistive construction.

Openings in fire-resistance-rated walls shall be protected by opening protectives having a one and one-half hour fire protection rating.

429.6.7 Draft stops. *Superstructure* draft stops shall be installed as specified in Section 718. *Substructure* draft stops constructed as specified in Section 429.5.2 shall be installed in line with the *superstructure* draft stops above. See Section 429.11 for draft curtain requirements.

429.6.8 Means of egress. Means of egress shall be provided as specified in Chapter 10.

Exceptions:

1. Where two means of egress are required from an occupancy, they shall not terminate on the same open deck.
2. An open deck is permitted to be considered an exit court and shall not be less than 10 feet (3048 mm) in width.
3. In Group A occupancies, the maximum travel distance shall not be more than 75 percent of that specified in Section 1017.
4. Boat moorages that have no sales, service or repair facilities are permitted to have a single means of egress not less than 3 feet (914 mm) wide and shall be exempt from the requirements of Section 1017 if a Class I standpipe is provided as specified in Section 429.8.

429.7 Width of piers. Floats, *piers* and walkways shall provide an *aisle* not less than 3 feet 6 inches (1067 mm) in width for the purpose of fire department access.

Exception: Floats, *piers* and walkways that are less than 40 feet (12192 mm) in length and that are not open to the public.

429.8 Standpipe systems. A manual Class I standpipe system (or Class III standpipe system when *approved* by the *fire code official*) in accordance with NFPA Standard 14 shall be provided for *piers*, wharves, and floats where the hose lay distance from the fire apparatus to the most remote accessible portion of the *pier*, *wharf* or float exceeds 150 feet (45720 mm). *Approved* plastic pipe may be used when installed underwater, or other *approved* method of protection from fire is provided. The standpipe piping shall be a minimum of 4 inches (102 mm), sized to provide a minimum of 500 gpm at 130 psi at the most remote hose connection, with a simultaneous flow of 500 gpm at the third most remote hose connection on the same *pier* while maintaining a maximum system pressure of 175 psi. Existing standpipe systems providing equivalent performance to the specification listed above may be acceptable when *approved* by the *fire code official*.

429.8.1 Hose connections. Hose connection stations on required standpipes shall be provided at the water end of the *pier*, *wharf*, or float, and along the entire length of the *pier*, *wharf*, or float at spacing not to exceed 150 feet (45720 mm) and as close as practical to the land end.

Exception: The hose connection at the land end of the *pier*, *wharf* or float may be omitted when a hose connection is located within 150 feet (45,720 mm) of the fire apparatus access road.

Each hose connection shall consist of a valved 2-1/2-inch (64 mm) fire department hose outlet. Outlet caps shall have a predrilled 1/8-inch (3.2 mm) hole for pressure relief and be secured with a short length of chain or cable to prevent falling after removal. Listed equipment shall be used.

429.8.2 Hose stations. Hose stations on required standpipes shall be provided at spacing not to exceed 100 feet, with the first hose station located as close as practicable to the land end of the *pier*. Each hose station shall have 100 feet of 1½-inch hose mounted on a reel or rack and enclosed within an *approved* cabinet. A valved 2½-inch fire department hose outlet shall be provided at each hose station. Outlet caps shall have a 1/8-inch predrilled hole for pressure relief and be secured with a short length of chain or cable to prevent falling after removal. Listed equipment shall be used. Hose stations shall be labeled FIRE HOSE-EMERGENCY USE ONLY.

429.8.3 Freeze protection. Standpipe systems shall be maintained dry when subject to freezing temperatures, and always from November 1 through March 31. The 1½-inch hose stations shall be tagged out of service when the system is drained. The main water supply control valve shall be readily accessible and clearly labeled so that the system may be quickly restored to full service during periods when the system is drained down.

Exception: Other methods of freeze protection, such as listed freeze valves, are permitted to be provided when *approved* by the *fire code official*.

429.9 Automatic sprinklers.

429.9.1 Covered boat moorage. Automatic sprinklers shall be provided for *covered boat moorage* exceeding 500 square feet in projected roof area per *pier*, *wharf* or float.

The sprinkler system shall be designed and installed in accordance with NFPA 13 for Extra Hazard Group 2 occupancy.

If sprinklers are required by this section, they shall be extended to any structure on the *pier*, *wharf* or float exceeding 500 square feet in projected roof area.

429.9.2 Substructure. Automatic sprinklers shall be installed under the *substructure* of every new waterfront structure in accordance with NFPA 307 and as specified in Chapter 9.

Exception: Sprinklers are not required in the following locations:

1. Combustible *substructures* whose deck area does not exceed 8,000 square feet (743.2 m^2) supporting no *superstructures*.
2. Combustible *substructures* whose deck area does not exceed 8,000 square feet (743.2 m^2) supporting *superstructures* not required to be provided with an *approved automatic sprinkler system* as specified in Section 429.9.3.
3. Noncombustible *substructures* with or without *superstructures*.
4. *Substructures*, over other than tidal water, where sprinkler heads cannot be installed with a minimum clearance of 4 feet (1219 mm) above mean high water.
5. *Substructures* resulting from walkways or finger *piers* that do not exceed l0 feet (3048 mm) in width.

429.9.3 Superstructure. Automatic sprinklers shall be provided in *superstructures* as required by Chapter 9.

429.9.4 Monitoring. Sprinkler systems shall be monitored by an *approved* central station service.

429.10 Smoke and heat vents. *Approved* automatic smoke and heat vents shall be provided in *covered boat moorage* areas exceeding 2,500 square feet (232 m^2) in area, excluding roof overhangs.

Exception: Smoke and heat vents are not required in areas protected by automatic sprinklers.

429.10.1 Design and installation. Where smoke and heat vents are required they shall be installed near the roof peak, evenly distributed and arranged so that at least one vent is over each covered berth. The effective vent area shall be calculated using a ratio of one square foot of vent to every fifteen square feet of covered berth area (1:15). Each vent shall provide a minimum opening size of 4 feet by 4 feet.

429.10.2 Automatic operation. Smoke and heat vents shall operate automatically by actuation of a heat-responsive device rated at between 100°F (56°C) and 220°F (122°C) above ambient.

Exception: Gravity-operated drop out vents.

429.10.3 Gravity-operated drop out vents. Gravity operated dropout vents shall fully open within five minutes after the vent cavity is exposed to a simulated fire represented by a time-temperature gradient that reaches an air temperature of 500°F (260°C) within five minutes.

429.11 Draft curtains. Draft curtains shall be provided in *covered boat moorage* areas exceeding 2,500 square feet (232 m^2) in area, excluding roof overhangs.

Exception: Draft curtains are not required in areas protected by automatic sprinklers.

429.11.1 Draft curtain construction. Draft curtains shall be constructed of sheet metal, gypsum board or other *approved* materials that provide equivalent performance to resist the passage of smoke. Joints and connections shall be smoke tight.

429.11.2 Draft curtain location and depth. The maximum area protected by draft curtains shall not exceed 2,000 square feet (186 m^2) or two *slips* or berths, whichever is smaller. Draft curtains shall not extend past the piling line. Draft curtains shall have a minimum depth of 2 feet (609 mm) below the lower edge of the roof and shall not extend closer than 8 feet (2438 mm) to the walking surface on the *pier*.

429.12 Fire department connections. Standpipe and sprinkler systems shall be equipped with not less than a two-way 2½-inch fire department connection, which shall be readily visible and located at the fire department apparatus access. The fire department connection for Class I standpipe systems may be located at the shore end of the *pier*, *wharf*, or float if the distance between the fire apparatus access road and fire department connection is less than 150 feet (45720 mm). See Section 507 of the *International Fire Code* for requirements for fire hydrants.

429.13 Marina fire protection confidence testing. Standpipe and sprinkler systems shall be inspected and tested in compliance with the *International Fire Code*.

429.14 Fire department access. Fire department apparatus access lanes, not less than 20 feet wide and capable of supporting a 50,000-pound vehicle or 24,000 pounds per axle (HS20 loading), shall be provided and so located as to provide fire department apparatus access to within 50 feet travel distance to the shore end of all *piers*, wharves and floats.

[S] SECTION 430
PRIVATE AND UTILITY TRANSFORMER VAULTS

Note: Seattle City Light may have additional standards that supersede the requirements in this section.

430.1 Scope. Vaults housing private and utility transformers shall comply with the provisions of this chapter and Article 450 of the *Seattle Electrical Code*. The provisions of this chapter are minimum standards for all transformer vaults. Vaults containing utility transformers or equipment are required to comply with additional requirements of Seattle City Light.

430.2 When required.

430.2.1. Utility transformers. Transformer vaults are required for all utility transformers located inside a building. Seattle City Light shall approve the size, location, and layout of all utility vaults.

Exception: Vaults are not required for certain dry-type transformers rated 600 volts or less.

430.2.2 Private transformers. Transformer vaults are required for all oil-insulated private transformers. Vaults are required for other private transformers rated over 35,000 volts that are located inside a building.

Exception: Vaults are not required for certain oil-insulated private transformers in accordance with Sections 450.26 and 450.27 of the Seattle Electrical Code.

Note: Article 450, Part II of the Seattle Electrical Code contains requirements for transformers not required to be in a vault.

430.3 Access to transformer vaults.

430.3.1 General access. At least one door or hatch shall be provided in every vault. The opening shall be adequate in size to permit the installation and removal of the equipment located in the vault, and shall be kept unobstructed at all times. An unobstructed level area shall be provided at the entrance to all vaults. The level area shall be large enough to allow for movement of the transformer and equipment into and out of the vault.

430.3.2 Utility transformer vault access. *Utility transformer vaults* shall be accessible to Seattle City Light personnel at all times. If it is necessary to pass through locked doors to reach a vault, keys to those doors shall be kept in a key box that can be opened with the key to the transformer vault. The key box shall be mounted near the first door requiring a non-transformer door key. Persons other than Seattle City Light personnel shall not have access to *utility transformer vaults* without Seattle City Light personnel present.

All doors between the vault and the building exterior shall be large enough to accommodate the placement or removal of transformers. See Section 430.6 for doorway requirements.

Utility transformer vaults shall be located so that there is an equipment access path between the vault and the building exterior. The path shall comply with the following.

1. Sufficient horizontal and vertical clearance for the required transformer shall be provided;
2. The floor shall be smooth, without seams or ridges to impede transportation of heavy equipment;
3. There shall not be excessive slope as determined by Seattle City Light; and
4. The floor shall be designed to support the weight of the transformer and all equipment needed to move the transformer.

If Seattle City Light determines that it is infeasible to design a path in the prescribed manner, the building owner shall enter into a Transportation Agreement with Seattle City Light. The Transportation Agreement obligates the building owner to transport equipment between the right of way and the transformer vault whenever the Superintendent of Seattle City Light determines it is necessary, and to pay all costs for equipment transportation.

Note: The Transportation Agreement is a measure of last-resort and permitted only with prior Seattle City Light approval. A viable path for equipment transportation between the right-of-way and the transformer vault should be a primary design consideration.

430.4 Location of transformer vaults. Transformer vaults shall be located where they can be ventilated to the outside air without using flues or ducts wherever such an arrangement is practicable. Transformer vaults shall be dry and not subject to running, standing or infiltration of water.

Transformer vaults shall not be located where they are subject to flooding due to ground water without specific written approval by Seattle City Light.

430.5 Construction.

430.5.1 Private transformer vaults. *Private transformer vaults* shall comply with the following minimum requirements.

1. All *private transformer vaults* shall be of at least three-hour fire-resistive construction.

   Exception: Subject to the approval of the *building official*, where the total capacity of private oil-insulated transformers does not exceed 112-1/2 kVA, the vault is permitted to be constructed of reinforced concrete not less than 4 inches (102 mm) thick.
2. Vault floors in contact with the earth shall be of concrete not less than 4 inches thick.
3. The transformer shall be anchored to inserts embedded in the concrete floor.

4. In pre-tensioned or post-tensioned concrete, cable locations shall be permanently marked on the surface of the concrete over the encased tendons.
5. Vault dimensions shall be adequate for required ventilation and working clearances.

430.5.2 Utility transformer vaults. *Utility transformer vaults* shall comply with the following minimum requirements. The Superintendent of Seattle City Light is authorized to adjust the requirements of this Section 430.5.2 when deemed necessary.

1. Floors, walls and ceilings of *utility transformer vaults* shall have at least a three-hour fire-resistance rating and shall be constructed of solid concrete or concrete-filled concrete masonry units at least 6 inches (152 mm) thick.
2. Vault floors shall be smooth with no pads.
3. Seismic anchor inserts shall be embedded in the floor and steel support channels shall be embedded in the ceiling when required by the Superintendent of Seattle City Light.
4. Pre-tensioned or post-tensioned concrete shall have the cable locations permanently marked on the surface of the concrete over the encased tendons.
5. Vault dimensions shall depend upon physical size and number of secondary connection devices, working clearances, and shall be *approved* by the Superintendent of Seattle City Light.

430.6 Openings into transformer vaults. Transformer vault openings shall comply with this section and Sections 705.8.2 and 705.8.3.

430.6.1 Protection of openings. All doorways opening into a transformer vault from the building interior shall be protected by opening protectives having a fire-protection rating equal to that required for the vault.

430.6.2 Doorways. All doors shall be made of three-hour fire-resistance-rated steel and shall swing out of the vault 180 degrees. Doors that may be prevented from swinging 180 degrees outward as a result of blockage by vehicles or mobile equipment shall be protected by bollards. The bollards shall preserve the door swing area and shall not obstruct the doorway. Equipment access doorways shall be sized to accommodate the transformer placement and removal including the equipment necessary to place or remove the transformer.

Equipment access doorways to vaults containing only single-phase utility transformers shall have clear openings no less than 42 inches (1067 mm) wide and 6 feet 8 inches (2057 mm) high. Equipment access doorways for all other utility transformers shall be sized to accommodate the transformer placement and as specified by Seattle City Light to allow equipment installation and removal.

Doorways for personnel access shall have clear openings of at least 36 inches (914 mm) wide and 6 feet 8 inches (2057 mm) high.

430.6.2.1 Locks. All doors shall be equipped with locks and shall be kept locked. Doors to *utility transformer vaults* shall be equipped with a cylinder capable of accepting the core provided by the utility. Personnel doors shall be equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressure.

430.6.2.2 Oil containment sill. A removable oil containment sill shall be as high as necessary to contain the oil of one transformer but in no case less than 4 inches (203 mm) high or as specified by Seattle City Light for utility transformers. A sill shall be installed within the vault at each doorway after the installation of the transformer.

430.7 Ventilation systems for transformer vaults.

430.7.1 General. Ventilation systems shall be provided to dispose of heat from transformer total losses without creating a temperature rise that exceeds the transformer rating.

430.7.2 Method of ventilation. Ventilation shall be provided by either natural circulation or mechanical circulation.

430.7.2.1 Natural circulation. Transformer vaults containing up to three transformers of no more than 75 kVA each are permitted to be ventilated by natural circulation. The combined minimum net intake and exhaust vent area, exclusive of area occupied by screens, grating or louvers, shall not be less than 3 square inches (1935 mm^2) per kVA of transformer capacity. The total required area shall be divided roughly equally between intake and exhaust. In no case shall either the intake or exhaust area be less than 72 square inches (46 452 mm^2).

Approximately one half the total area required for ventilation openings shall be for intake air. Intake air vents shall be located in one or more openings in the lower portion of the perimeter vault walls. When the vault is located in a garage, any lower openings must be at least 18 inches above the garage floor level. The remaining one half of the required ventilation area shall be used to exhaust heat through one or more openings in the upper portion of the perimeter walls or roof of the vault. Intake openings shall be located on the opposite side of the vault from exhaust openings allowing air to flow longitudinally over the transformer and out of the vault.

430.7.2.2 Mechanical circulation. Positive or negative pressure ventilation systems shall supply a minimum of 1.6 cfm (.76 L/s) of air per kVA of transformer capacity. The fans shall be installed outside of the vault and shall be controlled by a thermostat located inside the vault.

The intake vents shall be located in the lower one half of the perimeter walls of the vault. When the vault is located in a public garage or loading dock, any lower intake openings must be at least 18 inches above the garage floor level and at least 18 inches above the vault floor.

The exhaust vents shall be in the roof or ceiling of the vault. Vents are allowed to be installed in a wall if the top of the vent is not less than 12 inches below the vault ceiling. The top of the outlet on the exterior of the building shall be at least as high as the top of the outlet from the vault.

The ventilation system shall cause air to flow longitudinally across the transformers. The vault ventilation system shall be controlled independently from the rest of the building ventilation.

For *utility transformer vaults*, mechanical ventilation systems shall be designed by the applicant. The capacity and location of the ventilation system shall be *approved* by the Superintendent of Seattle City Light.

430.7.2.3 Temperature control. A remote temperature controller shall be installed in *utility transformer vaults* that have mechanical ventilation systems. The controller shall activate the fan when the temperature in the vault exceeds 70°F (21°C), and shall turn the fan off when the temperature reaches 140°F (60°C).

A visible or audible alarm shall be installed outside each *utility transformer vault* that will be activated if the fan does not operate when the temperature controller calls for ventilation, or if the fan becomes inoperable. A sign shall be mounted near the alarm stating CALL SEATTLE CITY LIGHT WHEN ALARM SOUNDS or CALL SEATTLE CITY LIGHT WHEN LIGHT IS ON.

430.7.3 Ventilation openings and duct terminations. Ventilation openings and duct terminations shall comply with *International Mechanical Code* Section 501.3.1 item 7, unless otherwise *approved* by the *building official*.

430.7.3.1 Location of exhaust ventilation openings and exhaust duct terminations. Exhaust ventilation openings and duct terminations shall be located not less than 10 feet (3048 mm) from fire escapes, required means of egress at the exterior of the building, elements of the exit discharge, combustible exterior wall coverings, openings that are not protected in accordance with Section 705.8, operable openings and property lines other than a public way and above finished walking surfaces. Exhaust outlets shall be located on the exterior of the building.

Interpretation I430.7: For purposes of this section, "property line" includes any property line separating one lot from another lot, but does not include any property line separating a lot from a public street or alley right-of-way. The separation distance may be measured to the opposite side of public streets and alleys.

430.7.3.2 Covering. Ventilation openings shall be covered with durable metal gratings, screens or louvers. If operable intake louvers are provided on mechanically ventilated transformer vaults, the louvers shall be controlled by the fan thermostat, i.e. the louvers shall be opened when the fan is energized.

430.7.3.3 Opening protection. Intake ventilation openings in the vault walls on the interior and exterior of the building shall be protected by automatic closing fire dampers having a fire-protection rating at least equal to that required for the vault. The actuating device on the fire damper shall be made to function at a temperature of 165°F (74°C).

430.7.3.4 Ventilation ducts. Exhaust ventilation ducts, if used, shall be enclosed in construction having a fire-resistance rating at least equal to that required for the vault. Exhaust ducts shall extend from the vault to the outside of the building. An exhaust duct for a mechanically ventilated vault shall be used exclusively for ventilating the vault. No fire dampers shall be installed in exhaust ventilation ducts.

430.8 Drainage for vaults.

430.8.1 General. Drains are prohibited in all transformer vaults.

430.8.2 Sumps. All transformer vaults containing oil-insulated transformers shall have a dry sump. All sumps shall have an opening of at least 6 inches (152 mm) diameter, a depth of at least 12 inches (305 mm), and shall be equipped with a removable steel grate that is flush with the floor. Sumps shall have at least an 8 gallon (30 liter) capacity. Sump capacity may be greater where required by the utility. The sump shall have a grouted bottom. The sump shall be located near, but not directly behind, the personnel door and shall be out of the entry path for moving transformers in and out of the vault. The vault floor shall slope at least 1 inch in 10 feet (25 mm in 3048 mm) toward the sump.

430.9 Pipes and ducts in transformer vaults. No pipes or ducts foreign to the electrical installation shall enter or pass through any transformer vault. Electrical conduits terminating at transformer vaults shall be sealed with listed three-hour fire-protection rated firestop material. Electrical conduits terminating at transformer vaults shall be installed to avoid channeling water into the vault. Electrical conduits entering the vault floor shall be rigid galvanized steel and shall extend no less than 18 inches (457 mm) into the vault or to the top of the containment sill, whichever is greater.

430.10 Storage in transformer vaults. No material shall be stored in any transformer vault.

430.11 Sprinkler systems. Sprinkler systems shall not be installed within a transformer vault. The vault must be maintained in a dry condition at all times.

CHAPTER 5

GENERAL BUILDING HEIGHTS AND AREAS

User note:

About this chapter: *Chapter 5 establishes the limits to which a building can be built. Building height, number of stories and building area are specified in this chapter. Chapter 5 must be used in conjunction with the occupancies established in Chapter 3 and the types of construction established in Chapter 6. This chapter also specifies the impact that mezzanines, accessory occupancies and mixed occupancies have on the overall size of a building.*

SECTION 501
GENERAL

501.1 Scope. The provisions of this chapter control the height and area of structures hereafter erected and *additions* to existing structures.

SECTION 502
BUILDING ADDRESS

[S][F] 502.1 Address identification. New and existing buildings shall be provided with *approved* address identification. The address identification shall be legible and placed in a position that is visible from the street or road fronting the property. Address identification characters shall contrast with their background. Address numbers shall be Arabic numbers or alphabetical letters. Numbers shall not be spelled out. Each character shall be a minimum of 4 inches (102 mm) high with a minimum stroke width of 1/2 inch (12.7 mm). Where required by the fire code official, address identification shall be provided in additional approved locations to facilitate emergency response. Where access is by means of a private road and the building address cannot be viewed from the public way, a monument, pole or other approved sign or means shall be used to identify the structure. Address identification shall be maintained.

501.2.1 Enforcement by building official. The *building official* shall determine the address of any property in the City in accordance with the numbering system established in this chapter.

Whenever the irregularity of plats, the changing direction of streets, avenues, or other highways, the interruption of the continuity of highways or any other condition causes doubt or difference of opinion as to the correct number of any piece of property or any building thereon, the number shall be determined by the *building official*. The *building official* shall be guided by the specific provisions of this chapter as far as they are applicable and when not applicable, by such rules as are established to carry out the intent of this chapter.

501.2.1.1 Owners to affix and maintain building numbers. The owner of any *building* or other structure shall maintain the street number of each *building* and structure in a conspicuous place over or near the principal street entrance or entrances, or in other conspicuous places as is necessary for the easy locating of such address.

Exception: Where there are multiple *buildings* on a site, the *building official* is permitted to waive the requirement for posting an address on appurtenant or accessory buildings where individual identification of each building is not essential.

Where a property has frontage along more than one named street, or for any other property, where there may be confusion regarding the address of a *building* or *structure*, the *building official* is permitted to require the complete address, including street number and street name to be conspicuously posted.

For *buildings* served by a private road or a common driveway, the address number(s) shall be posted at the head of the road or driveway in a manner that can be easily read from the intersecting street. Where the existing street grid may not adequately allow for the assignment of street addresses that will promote the easy locating of such addresses, or for any other reason consistent with the intent of this chapter, the *building official* is permitted to assign a name to the private road or common driveway that shall be used for addressing purposes. In addition, the *building official* is permitted to require one or more property owners along the road or driveway to post a sign displaying the assigned name at a location near the intersection of the road or driveway with a named public street.

If the *building official* finds that a *building*, structure or premises is not provided with numbers as herein required, or is not correctly numbered, the *building official* is permitted to notify the owner, agent or tenant of the correct street number and require that the number be properly placed, in accordance with the provisions of this chapter, within a reasonable length of time. It is a violation of this code for any *person* to fail to comply with such notice.

501.2.2 Numbering system prescribed. The numerical designation of all doorways and entrances to buildings and lots fronting upon the named right-of-ways of the City are established in accordance with the following system:

Except where otherwise specified, 100 numbers are allotted to each block, provided that where a named right-of-way intervenes between consecutively numbered right-of-ways, 50 numbers shall be allotted for each block. One whole number is allotted to each 20 feet (6096 mm) of frontage in each block; even numbers shall be used on the northerly side of named right-of-ways extending in an easterly and westerly direction and on the easterly side of named right-of-ways extending in a northerly and southerly direction. Odd numbers shall be used on the southerly side of named right-of-ways extending in an easterly and westerly direction and on the westerly side of named right-of-ways extending in a northerly and southerly direction.

In the case of irregular named right-of-ways, the frontages shall be numbered as near as may be according to the uniform series of block numbers with which they most nearly correspond.

501.2.3 Numbering of buildings

501.2.3.1 Numbering of buildings downtown. Between Yesler Way and Denny Way all frontages upon named right-of-ways extending in a northerly and southerly direction and lying west of Broadway, East Union Street, Minor Avenue and Melrose Avenue shall be numbered as follows:

Yesler Way to Fir Street number 100 and upwards, Fir Street to Spruce Street number 150 and upwards, Spruce Street to Alder Street number 200 and upwards, continuing by consecutive hundreds to Pine Street; Pine Street to Olive Way number 1600 and upwards, Olive Way to Howell Street number 1700 and upwards, Howell Street to Stewart Street number 1800 and upwards, Stewart Street to Virginia Street number 1900 and upwards, continuing by consecutive hundreds to Denny Way.

Between East Yesler Way and East Denny Way all frontages upon named right-of-ways extending in a northerly and southerly direction and lying east of Broadway, East Union Street, Minor Avenue and Melrose Avenue shall be numbered as follows:

East Yesler Way to East Fir Street number 100 and upwards, East Fir Street to East Spruce Street number 150 and upwards, East Spruce Street to East Alder Street number 200 and upwards, continuing by consecutive hundreds to East Marion Street; East Marion Street to East Spring Street number 900 and upwards, East Spring Street to East Union Street number 1100 and upwards, East Union Street to East Pike Street number 1400 and upwards, continuing by consecutive hundreds to East Denny Way.

Between East Yesler Way and East Denny Way all frontages upon named right-of-ways extending in an easterly and westerly direction and lying west of Broadway, East Union Street, Minor Avenue and Melrose Avenue shall be numbered as follows:

Southwesterly from Elliott Avenue, or Alaskan Way if south of Lenora Street, number 51 and downwards; Elliott Avenue (or Alaskan Way) to Western Avenue number 52 and upwards; Western Avenue to First Avenue number 76 and upwards; First Avenue to Second Avenue number 100 and upwards, continuing northeasterly to Broadway, East Union Street, Minor Avenue, or Melrose Avenue by consecutive hundreds.

Between East Yesler Way and East Denny Way all frontages upon named right-of-ways extending in an easterly and westerly direction and lying east of Broadway, East Union Street, Minor Avenue and Melrose Avenue shall be numbered as follows:

Melrose Avenue to Bellevue Avenue number 300 and upwards, Bellevue Avenue to Summit Avenue number 400 and upwards, continuing by consecutive hundreds to Broadway.

Broadway to Tenth Avenue number 900 and upwards, Tenth Avenue to Eleventh Avenue number 1000 and upwards, continuing by consecutive hundreds corresponding with the numbered series of avenues eastward to Lake Washington.

On East Olive Way eastward from Melrose Avenue, the street numbers shall run upwards consecutively, eastward from the existing street numbers that are west of the Melrose Avenue intersection.

501.2.3.2 Numbering of buildings south of downtown and east of the East Waterway. South of Yesler Way the frontages upon the named right-of-ways extending in a northerly and southerly direction shall be numbered as follows:

Yesler Way (or East Yesler Way) to South Washington Street number 100 and upwards, South Washington Street to South Main Street number 200 and upwards, South Main Street to South Jackson Street number 300 and upwards, South Jackson Street to South King Street number 400 and upwards, continuing by consecutive hundreds to South Barton Place, with blocks and streets on Rainier Avenue South being taken as the controlling series.

South of South Barton Place, 51st Avenue South shall be taken as the controlling series to the southern City limits.

On Second Avenue Extension South from Fourth Avenue South to Yesler Way, the frontages shall be numbered as follows:

From Fourth Avenue South to South Jackson Street number 100 and upwards, South Jackson Street to South Main Street number 200 and upwards, South Main Street to South Washington Street number 300 and upwards, South Washington Street to Yesler Way number 400 and upwards.

South of Yesler Way the frontages upon named right-of-ways extending in an easterly and westerly direction shall be numbered as follows:

Westward from First Avenue South to the Harbor Line or East Waterway number 99 and downwards, First Avenue South to Occidental Avenue South number 100 and upwards, Occidental Avenue South to Second Avenue South number 150 and upwards, Second Avenue South to Third Avenue South number 200 and upwards, continuing by consecutive hundreds to Sixth Avenue South; Sixth Avenue South to Maynard Avenue South number 600 and upwards, Maynard Avenue South to Seventh Avenue South number 650 and upwards, Seventh Avenue South to Eighth Avenue South (or Airport Way south of South Hinds Street) number 700 and upwards, Eighth Avenue South (or Airport Way south of South Hinds Street) to Airport Way South (or Ninth Avenue South of South Hinds Street) number 800 and upwards, Airport Way South (or Ninth Avenue South of South Hinds Street) to Interstate Highway 5 number 900 and upwards, continuing eastward by consecutive hundreds corresponding with the numbered series of avenues to Lake Washington.

501.2.3.3 Numbering of buildings between downtown and the Lake Washington Ship Canal. North of Denny Way, East Denny Way, and East Howell Street east of Madrona Drive the frontages upon the named right-of-ways extending in a northerly and southerly direction shall be numbered as follows:

Denny Way (and East or West Denny Way) to John Street (and East or West John Street) number 100 and upwards, continuing by consecutive hundreds, the blocks and streets on Queen Anne Avenue North being taken as a controlling series for numbering purposes west of Fairview Avenue North (or Fairview Avenue East) and south of Bertona Street (or West Bertona Street); 36th Avenue West being taken as the controlling series for numbering purposes west of Fairview Ave North (or Fairview Ave East) and north of Bertona Street (or West Bertona Street); Tenth Avenue East being taken as the controlling series for numbering purposes east of Fairview Avenue North (or Fairview Avenue East).

Between Queen Anne Avenue North and Eastlake Avenue East (East Galer being the northeast boundary of this subsection) the frontages on the named right-of-ways extending in an easterly and westerly direction shall be numbered as follows:

Queen Anne Avenue North to First Avenue North number 1 and upwards, First Avenue North to Warren Avenue North number 100 and upwards, Warren Avenue North to Second Avenue North number 150 and upwards, Second Avenue North to Third Avenue North number 200 and upwards, continuing by consecutive hundreds corresponding to the numbered series of avenues with half hundreds in the case of Nob Hill, Taylor, Bigelow, Mayfair, and Dexter Avenues North, to Ninth Avenue North; Ninth Avenue North to Westlake Avenue North number 900 and upwards, Westlake Avenue North to Terry Avenue North number 950 and upwards, Terry Avenue North to Boren Avenue North number 1000 and upwards, Boren Avenue North to Fairview Avenue North number 1100 and upwards, Fairview Avenue North to Minor Avenue North number 1150 and upwards, Minor Avenue North to Pontius Avenue North number 1200 and upwards, Pontius Avenue North to Yale Avenue North number 1250 and upwards, Yale Avenue North to Eastlake Avenue East number 1300 and upwards.

East of Eastlake Avenue East (or Fairview Avenue East north of East Galer Street) and North of East Denny Way the frontages upon the named east-west right-of-ways extending in an easterly and westerly direction shall be numbered as follows:

Eastlake Avenue East to Melrose Avenue East number 200 and upwards continuing by consecutive hundreds eastward to Broadway East; Broadway East to Tenth Avenue East number 900 and upwards, Tenth Avenue East to Federal Avenue East number 1000 and upwards, Federal Avenue East to Eleventh Avenue East number 1050 and upwards, Eleventh Avenue East to Twelfth Avenue East number 1100 and upwards, continuing by consecutive hundreds eastward to Lake Washington.

West of Queen Anne Avenue North the frontages upon named east-west right-of-ways extending in an easterly and westerly direction shall be numbered westward as follows:

Queen Anne Avenue North to First Avenue West number 1 and upwards, First Avenue West to Second Avenue West number 100 and upwards, continuing by consecutive hundreds westward.

501.2.3.4 Numbering of buildings north of the Lake Washington Ship Canal. The plan for the numbering of frontages upon the various named right-of-ways in that portion of the City of Seattle lying north of the Lake Washington Ship Canal is established as follows:

The frontages upon the named right-of-ways extending in a northerly and southerly direction shall be numbered in accordance with the designations of the intersecting numbered streets as follows: northward from the State Harbor Line, number 2900 and upwards.

The frontages upon the named right-of-ways extending in an easterly and westerly direction shall be numbered as follows:

West from First Avenue Northwest, commencing with 100, and continuing west in correspondence with the numbers of the avenues to Puget Sound.

East from First Avenue Northwest, commencing with 100 and continuing as follows: East from Palatine Avenue North, 200 and upwards; from Greenwood Avenue North, 300 and upwards; from Phinney Avenue North, 400 and upwards; from Francis Avenue North, 450 and upwards; from Dayton Avenue North, 500 and upwards; from Evanston Avenue North, 600 and upwards; from Fremont Avenue North, 700 and upwards; from North Park Avenue North, 800 and upwards; from Linden Avenue North, 900 and upwards (800 and upwards south of North 65th Street); from Aurora Avenue North, 900 and upwards (1100 and upwards north of North 65th Street); from Winslow Place North, 950 and upwards; from Whitman Avenue North 1000 and upwards; from Albion Place North, 1050 and upwards; from Woodland Park Avenue North, 1100 and upwards; from Nesbit Avenue North, 1150 and upwards; from Midvale Avenue North, 1200 and upwards; from Lenora Place North, 1250 and upwards; from Stone Avenue North (Stone Way North south of North 46th Street), 1300 and upwards; from Interlake Avenue North, 1400 and upwards; from Ashworth Avenue North, l500 and upwards; from Carr Place North, 1550 and upwards; from Woodlawn Avenue North, 1600 and upwards, from Densmore Avenue North, 1700 and upwards; from Caroline Avenue North and Courtland Place North, 1750 and upwards; from Wallingford Avenue North, 1800 and upwards; from Burke Avenue North and Canfield Place North, 1900 and upwards; From Stroud Avenue North and Wayne Place North, 2000 and upwards; from Meridian Avenue North, 2100 and upwards; from Bagley Avenue North, 2200 and upwards; from Corliss Avenue North, 2300 and upwards; from Sunnyside Avenue North, 2400 and upwards; and from Eastern Avenue North, 2500 and upwards.

East from First Avenue Northeast, commencing with 100, and continuing east in correspondence with the numbered avenues to Lake Washington.

501.2.3.5 Numbering buildings on Harbor Island. The frontages upon named right-of-ways extending in a northerly and southerly direction shall be numbered as follows:

Southwest Massachusetts Street to Southwest Florida Street, number 1700 and upwards; Southwest Florida Street to Southwest Lander Street, number 2500 and upwards; Southwest Lander Street to Southwest Hanford Street, number 2700 and upwards; Southwest Hanford Street to Southwest Spokane Street, number 3200 and upwards.

The frontages upon named right-of-ways extending in an easterly and westerly direction shall be numbered as follows:

The East Waterway to 11th Avenue Southwest, number 900 and upwards; 11th Avenue Southwest to 13th Avenue Southwest, number 1100 and upwards; 13th Avenue Southwest to 16th Avenue Southwest, number 1300 and upwards; 16th Avenue Southwest to the West Waterway, number 1600 and upwards.

501.2.3.6 Numbering buildings west of the West Waterway and the Duwamish Waterway. The frontages upon named right-of-ways extending in a northerly and southerly direction, shall be numbered as follows:

North of Southwest Andover Street, commencing with 3800 and continuing north to the Duwamish Head by consecutive hundreds, the blocks and streets on California Avenue Southwest being taken as the controlling series for numbering purposes.

South of Southwest Andover Street, commencing with 4000 and continuing south to Southwest Roxbury Street by consecutive hundreds, the blocks and streets of California Avenue Southwest being taken as the controlling series for numbering purposes.

South of Southwest Roxbury Street, commencing with 9600 and continuing south to the south City limits by consecutive hundreds, in correspondence with the numbers of the intersecting streets.

The frontages upon named right-of-ways extending in an easterly and westerly direction, shall be numbered as follows:

West of California Avenue Southwest, commencing with 4300 and continuing westward in correspondence with the numbers of the intersecting avenues to Puget Sound.

East of California Avenue Southwest, commencing with 4200 and continuing eastward in correspondence with the numbers of the intersecting avenues to the Duwamish Waterway.

SECTION 503
GENERAL BUILDING HEIGHT AND AREA LIMITATIONS

503.1 General. Unless otherwise specifically modified in Chapter 4 and this chapter, *building height,* number of *stories* and *building area* shall not exceed the limits specified in Sections 504 and 506 based on the type of construction as determined by Section 602 and the occupancies as determined by Section 302 except as modified hereafter. *Building height,* number of *stories* and *building* area provisions shall be applied independently. For the purposes of determining area limitations, height limitations

and type of construction, each portion of a building separated by one or more *fire walls* complying with Section 706 shall be considered to be a separate building.

503.1.1 Special industrial occupancies. Buildings and structures designed to house special industrial processes that require large areas and unusual *building heights* to accommodate craneways or special machinery and equipment, including, among others, rolling mills; structural metal fabrication shops and foundries; or the production and distribution of electric, gas or steam power, shall be exempt from the *building height*, number of *stories* and *building area* limitations specified in Sections 504 and 506.

503.1.2 Buildings on same lot. Two or more buildings on the same lot shall be regulated as separate buildings or shall be considered as portions of one building where the *building height*, number of *stories* of each building and the aggregate *building area* of the buildings are within the limitations specified in Sections 504 and 506. The provisions of this code applicable to the aggregate building shall be applicable to each *building*.

503.1.3 Type I construction. Buildings of Type I construction permitted to be of unlimited tabular *building heights and areas* are not subject to the special requirements that allow unlimited area buildings in Section 507 or unlimited *building height* in Sections 503.1.1 and 504.3 or increased *building heights and areas* for other types of construction.

[W] 503.1.4 Occupied roofs. A roof level or portion thereof shall be permitted to be used as an occupied roof provided the occupancy of the roof is an occupancy that is permitted by Table 504.4 for the story immediately below the roof. The area of the occupied roofs shall not be included in the building area as regulated by Section 506.

Exceptions:

1. The occupancy located on an occupied roof shall not be limited to the occupancies allowed on the *story* immediately below the roof where the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2 and occupant notification in accordance with Section 907.5 is provided in the area of the occupied roof. Emergency voice/alarm communication system notification per Section 907.5.2.2 shall also be provided in the area of the occupied roof where such system is required elsewhere in the building.
2. Assembly occupancies shall be permitted on roofs of open parking garages of Type I or Type II construction, in accordance with the exception to Section 903.2.1.6.

[S] 503.1.4.1 ((~~Enclosures over~~)) Enclosure of occupied roof areas. Elements or structures enclosing the occupied roof areas shall not extend more than 48 inches (1220 mm) above the surface of the occupied roof.

Exception: Penthouses constructed in accordance with Section 1510.2 and towers, domes, spires and cupolas constructed in accordance with Section 1510.5.

SECTION 504
BUILDING HEIGHT AND NUMBER OF STORIES

504.1 General. The height, in feet, and the number of *stories* of a building shall be determined based on the type of construction, occupancy classification and whether there is an *automatic sprinkler system* installed throughout the building.

Exception: The *building height* of one-*story* aircraft hangars, aircraft paint hangars and buildings used for the manufacturing of aircraft shall not be limited where the building is provided with an *automatic sprinkler system* or *automatic fire-extinguishing system* in accordance with Chapter 9 and is entirely surrounded by *public ways* or *yards* not less in width than one and one-half times the *building height*.

504.1.1 Unlimited area buildings. The height of unlimited area buildings shall be designed in accordance with Section 507.

504.1.2 Special provisions. The special provisions of Section 510 permit the use of special conditions that are exempt from, or modify, the specific requirements of this chapter regarding the allowable heights of buildings based on the occupancy classification and type of construction, provided the special condition complies with the provisions specified in Section 510.

504.2 Mixed occupancy. In a building containing mixed occupancies in accordance with Section 508, no individual occupancy shall exceed the height and number of *story* limits specified in this section for the applicable occupancies.

504.3 Height in feet. The maximum height, in feet, of a building shall not exceed the limits specified in Table 504.3.

Exception: Towers, spires, steeples and other roof<u>top</u> structures shall be constructed of materials consistent with the required type of construction of the building except where other construction is permitted by Section 1510.2.4. Such structures shall not be used for habitation or storage. The structures shall be unlimited in height where of noncombustible materials and shall not extend more than 20 feet (6096 mm) above the allowable building height where of combustible materials (see Chapter 15 for additional requirements).

GENERAL BUILDING HEIGHTS AND AREAS

[W][S] TABLE 504.3[i]
ALLOWABLE BUILDING HEIGHT IN FEET ABOVE GRADE PLANE[a]

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION											
		TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
		A	B	A	B	A	B	A	B	C	HT	A	B
A, B, E, F, M, S, U	NS[b]	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	270	180	85	85	70	60
H-1, H-2, H-3, H-5	NS[c, d]	UL	160	65	55	65	55	120	90	65	65	50	40
	S												
H-4	NS[c, d]	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	140	100	85	85	70	60
I-1 Condition 1, I-3	NS[d, e]	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	180	120	85	85	70	60
I-1 Condition 2, I-2	NS[d, e, f]	UL	160	65	55	65	55	65	65	65	65	50	40
	S[i]	UL	180	85									
I-4	NS[d, g]	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	180	120	85	85	70	60
R[h]	NS[d]	UL	160	65	55	65	55	65	65	65	65	50	40
	S13D	60	60	60	60	60	60	60	60	60	60	50	40
	S13R	60	60	60	60	60	60	60	60	60	60	60	60
	S	UL	180	85	75	85	75	270	180	85	85	70	60

For SI: 1 foot = 304.8 mm.

UL = Unlimited; NS = Buildings not equipped throughout with an automatic sprinkler system; S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.
b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.
c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.
d. The NS value is only for use in evaluation of existing building height in accordance with the *International Existing Building Code*.
e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies Condition 1, see Exception 1 of Section 903.2.6.
f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and Section 1103.5 of the *International Fire Code*.
g. For new Group I-4 occupancies, see Exceptions 2 and 3 of Section 903.2.6.
h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.
i. I-1, Condition 2 Assisted living facilities licensed per chapter 388-78A WAC and residential treatment facilities as licensed by Washington State under chapter 246-337 WAC shall be permitted to use the allowable height above grade plane for R-2 occupancies.
j. A maximum of 12 inches of insulation may be added to the roof of an *existing building* without such additional height contributing to the *building height*.

504.4 Number of stories. The maximum number of *stories* of a building shall not exceed the limits specified in Table 504.4.

[W] TABLE 504.4
ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE[a, b]

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION												
	SEE FOOTNOTES	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
		A	B	A	B	A	B	A	B	C	HT	A	B
A-1	NS	UL	5	3	2	3	2	3	3	3	3	2	1
	S	UL	6	4	3	4	3	9	6	4	4	3	2
A-2	NS	UL	11	3	2	3	2	3	3	3	3	2	1
	S	UL	12	4	3	4	3	18	12	6	4	3	2
A-3	NS	UL	11	3	2	3	2	3	3	3	3	2	1
	S	UL	12	4	3	4	3	18	12	6	4	3	2
A-4	NS	UL	11	3	2	3	2	3	3	3	3	2	1
	S	UL	12	4	3	4	3	18	12	6	4	3	2
A-5	NS	UL	UL	UL	UL	UL	UL	1	1	1	UL	UL	UL
	S	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL
B	NS	UL	11	5	3	5	3	5	5	5	5	3	2
	S	UL	12	6	4	6	4	18	12	9	6	4	3
E	NS	UL	5	3	2	3	2	3	3	3	3	1	1
	S	UL	6	4	3	4	3	9	6	4	4	2	2
F-1	NS	UL	11	4	2	3	2	3	3	3	4	2	1
	S	UL	12	5	3	4	3	10	7	5	5	3	2
F-2	NS	UL	11	5	3	4	3	5	5	5	5	3	2
	S	UL	12	6	4	5	4	12	8	6	6	4	3
H-1	NS[c, d]	1	1	1	1	1	1	NP	NP	NP	1	1	NP
	S							1	1	1			
H-2	NS[c, d]	UL	3	2	1	2	1	1	1	1	2	1	1
	S							2	2	2			
H-3	NS[c, d]	UL	6	4	2	4	2	3	3	3	4	2	1
	S							4	4	4			
H-4	NS[c, d]	UL	7	5	3	5	3	5	5	5	5	3	2
	S	UL	8	6	4	6	4	8	7	6	6	4	3
H-5	NS[c, d]	4	4	3	3	3	3	2	2	2	3	3	2
	S							3	3	3			
I-1 Condition 1	NS[d, e]	UL	9	4	3	4	3	4	4	4	4	3	2
	S	UL	10	5	4	5	4	10	7	5	5	4	3
I-1 Condition 2	NS[d, e]	UL	9	4	3	4	3	3	3	3	4	3	2
	S[i]	UL	10	5				10	6	4			
I-2	NS[d, f]	UL	4	2	1	1	NP	NP	NP	NP	1	1	NP
	S	UL	5	3				7	5	1			
I-3	NS[d, e]	UL	4	2	1	2	1	2	2	2	2	2	1
	S	UL	5	3	2	3	2	7	5	3	3	3	2
I-4	NS[d, g]	UL	5	3	2	3	2	3	3	3	3	1	1
	S	UL	6	4	3	4	3	9	6	4	4	2	2
M	NS	UL	11	4	2	4	2	4	4	4	4	3	1
	S	UL	12	5	3	5	3	12	8	6	5	4	2
R-1[h]	NS[d]	UL	11	4	4	4	4	4	4	4	4	((~~3~~)) 4	2
	S13R	4	4									4	3
	S	UL	12	5	5	5	5	18	12	8	5	((~~4~~)) 5	3

[W] TABLE 504.4—continued
ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE[a, b]

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION													
	SEE FOOTNOTES	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
		A	B	A	B	A	B	A	B	C	HT	A	B
R-2[h]	NS[d]	UL	11	4	4	4	4	4	4	4	4	((~~3~~)) 4	2
	S13R	4	4	4								4	3
	S	UL	12	5	5	5	5	18	12	8	5	((~~4~~)) 5	3
R-3[h]	NS[d]	UL	11	4	4	4	4	4	4	4	4	((~~3~~)) 4	3
	S13D	4	4									3	3
	S13R	4	4									((~~4~~)) 5	4
	S	UL	12	5	5	5	5	18	12	5	5	4	4
((~~R-4[h]~~	~~NS[d]~~	~~UL~~	~~11~~	~~4~~	~~4~~	~~4~~	~~4~~				~~4~~	~~3~~	~~2~~
	~~S13D~~	~~4~~	~~4~~									~~3~~	~~2~~
	~~S13R~~	~~4~~	~~4~~									~~4~~	~~3~~
	~~S~~	~~UL~~	~~12~~	~~5~~	~~5~~	~~5~~	~~5~~				~~5~~	~~4~~	~~3~~))
S-1	NS	UL	11	4	2	3	2	4	4	4	4	3	1
	S	UL	12	5	3	4	3	10	7	5	5	4	2
S-2	NS	UL	11	5	3	4	3	4	4	4	4	4	2
	S	UL	12	6	4	5	4	12	8	5	5	5	3
U	NS	UL	5	4	2	3	2	4	4	4	4	2	1
	S	UL	6	5	3	4	3	9	6	5	5	3	2

UL = Unlimited; NP = Not Permitted; NS = Buildings not equipped throughout with an automatic sprinkler system; S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.
b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.
c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.
d. The NS value is only for use in evaluation of existing building height in accordance with the *International Existing Building Code*.
e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies, Condition 1, see Exception 1 of Section 903.2.6.
f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and 1103.5 of the *International Fire Code*.
g. For new Group I-4 occupancies, see Exceptions 2 and 3 of Section 903.2.6.
h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.
i. Group I-1, Condition 2. Assisted living facilities licensed per chapter 388-78A WAC and residential treatment facilities as licensed by Washington State under chapter 246-337 WAC shall be permitted to use the allowable height above grade plane for R-2 occupancies.

SECTION 505
MEZZANINES AND EQUIPMENT PLATFORMS

505.1 General. *Mezzanines* shall comply with Section 505.2. *Equipment platforms* shall comply with Section 505.3.

Interpretation I505.1: *Mezzanines* within individual *dwelling units* shall not be located above other *dwelling units* or common space other than corridors.

[S] 505.2 Mezzanines. A *mezzanine* or *mezzanines* in compliance with Section 505.2 shall be considered a portion of the *story* below. Such *mezzanines* shall not contribute to either the *building area* or number of *stories* as regulated by Section 503.1. The area of the *mezzanine* shall be included in determining the *fire area*. The clear height above and below the *mezzanine* floor construction shall be not less than 7 feet (2134 mm).

505.2.1 Area limitation. The aggregate area of a *mezzanine* or *mezzanines* within a room shall be not greater than ((~~one-third~~)) one-half of the floor area of that room or space in which they are located. The enclosed portion of a room shall not be included in a determination of the floor area of the room in which the *mezzanine* is located. In determining the allowable *mezzanine* area, the area of the *mezzanine* shall not be included in the floor area of the room.

((~~Exceptions~~)) Exception: ((~~1.~~)) The aggregate area of *mezzanines* in buildings and structures of Type I or II construction for special industrial occupancies in accordance with Section 503.1.1 shall be not greater than two-thirds of the floor area of the room.

((~~2. The aggregate area of *mezzanines* in buildings and structures of Type I or II construction shall be not greater than one-half of the floor area of the room in buildings and structures equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1 and an *approved emergency voice/alarm communication system* in accordance with Section 907.5.2.2.~~

~~3. The aggregate area of a *mezzanine* within a *dwelling unit* that is located in a building equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2 shall not be greater than one-half of the floor area of the room, provided that:~~

~~3.1. Except for enclosed closets and bathrooms, the *mezzanine* shall be open to the room in which such mezzanine is located;~~

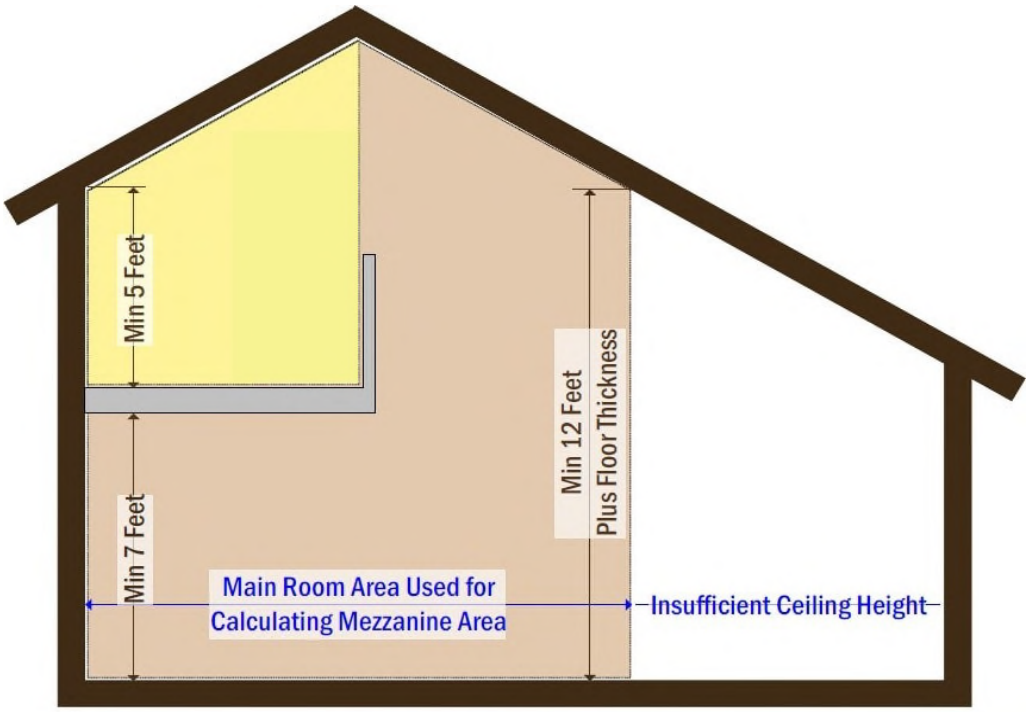
~~3.2. The opening to the room shall be unobstructed except for walls not more than 42 inches (1067 mm) in height, columns and posts; and~~

~~3.3. Exceptions to Section 505.2.3 shall not be permitted.~~))

Interpretation I505.2: Only the following unenclosed areas of the room or space containing the *mezzanine* shall be used for purposes of calculating the allowable *mezzanine* floor area:

1. Areas with a ceiling height of at least 7 feet located directly below the mezzanine, except that no additional area benefit shall be gained for stacked *mezzanines;* and
2. Areas where the ceiling has a slope of less than 2:12 and with a ceiling height of at least 14 feet plus the thickness of the *mezzanine* floor construction; and
3. Areas where the ceiling has a slope of 2:12 or more and has a ceiling height of at least 12 feet plus the thickness of the *mezzanine* floor construction, provided that the *mezzanine* complies with Section 1208.2, exception 2.

Within a *dwelling unit*, enclosed or unenclosed portions of the entire floor level containing the *mezzanine* that meet requirements of this interpretation for the room area may be used for purposes of calculating the allowable *mezzanine* floor area.



Basis for Calculating Allowable Mezzanine Area
When Using Sloped Ceiling Provisions

FIGURE I505.2(1)
BASIS FOR CALCULATING ALLOWABLE MEZZANINE AREA WHEN USING SLOPED CEILING PROVISIONS

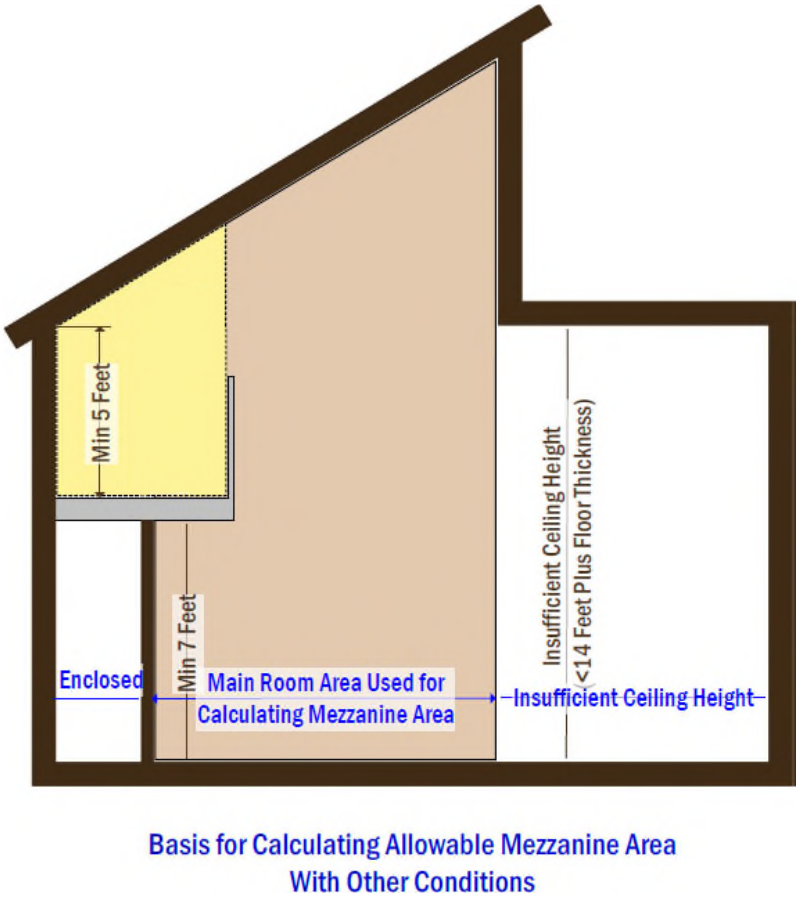


FIGURE I505.2(2)
BASIS FOR CALCULATING ALLOWABLE MEZZANINE AREA WITH OTHER CONDITIONS

505.2.1.1 Aggregate area of mezzanines and equipment platforms. Where a room contains both a *mezzanine* and an *equipment platform*, the aggregate area of the two raised floor levels shall be not greater than two-thirds of the floor area of that room or space in which they are located. The area of the *mezzanine* shall not exceed the area determined in accordance with Section 505.2.1.

505.2.2 Means of egress. The *means of egress* for *mezzanines* shall comply with the applicable provisions of Chapter 10.

505.2.3 Openness. A *mezzanine* shall be open and unobstructed to the room in which such *mezzanine* is located except for walls not more than 42 inches (1067 mm) in height, columns and posts.

Exceptions:

1. *Mezzanines* or portions thereof are not required to be open to the room in which the *mezzanines* are located, provided that the *occupant load* of the aggregate area of the enclosed space is not greater than 10.
2. A *mezzanine* having two or more exits or access to exits is not required to be open to the room in which the *mezzanine* is located.
3. *Mezzanines* or portions thereof are not required to be open to the room in which the *mezzanines* are located, provided that the aggregate floor area of the enclosed space is not greater than 10 percent of the allowable *mezzanine* area.
4. In industrial facilities, *mezzanines* used for control equipment are permitted to be glazed on all sides.
5. In occupancies other than Groups H and I, which are no more than two *stories* above *grade plane* and equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, a *mezzanine* having two or more *exits* or *access to exits* shall not be required to be open to the room in which the *mezzanine* is located.

[S] 505.3 Equipment platforms. ((~~*Equipment platforms* in buildings shall not be considered as a portion of the floor below. Such *equipment platforms* shall not contribute to either the *building area* or the number of *stories* as regulated by Section 503.1. The area of the *equipment platform* shall not be included in determining the *fire area* in accordance with Section 903. *Equipment platforms* shall not be a part of any *mezzanine* and such platforms and the walkways, *stairways, alternating tread devices* and ladders providing access to an *equipment platform* shall not serve as a part of the *means of egress* from the building.~~)) Equip-

ment platforms and building elements supporting only the platform shall be built of materials permitted for the type of construction of the building. *Equipment platforms* in building shall not:

1. Be considered as a portion of the floor below.
2. Contribute to either the *building area* or the number of *stories* as regulated by Section 503.1.
3. Be included in determining the *fire area* in accordance with Section 903.
4. Be a part of any *mezzanine*.
5. Serve as a part of the *means of egress* from the building, including the walkways, *stairs*, *alternating tread devices* and ladders providing access to an equipment platform.

505.3.1 Area limitation. The aggregate area of all *equipment platforms* within a room shall be not greater than two-thirds of the area of the room in which they are located. Where an *equipment platform* is located in the same room as a *mezzanine*, the area of the *mezzanine* shall be determined by Section 505.2.1 and the combined aggregate area of the *equipment platforms* and *mezzanines* shall be not greater than two-thirds of the room in which they are located. The area of the *mezzanine* shall not exceed the area determined in accordance with Section 505.2.1.

505.3.2 Automatic sprinkler system. Where located in a building that is required to be protected by an *automatic sprinkler system*, *equipment platforms* shall be fully protected by sprinklers above and below the platform, where required by the standards referenced in Section 903.3.

505.3.3 Guards. *Equipment platforms* shall have *guards* where required by Section 1015.2.

SECTION 506
BUILDING AREA

[S] 506.1 General. The allowable floor area of a building shall be determined based on the type of construction, occupancy classification, whether there is an *automatic sprinkler system* installed throughout the building and the amount of building frontage on public way or open space.

506.1.1 Unlimited area buildings. Unlimited area buildings shall be designed in accordance with Section 507.

506.1.2 Special provisions. The special provisions of Section 510 permit the use of special conditions that are exempt from, or modify, the specific requirements of this chapter regarding the allowable areas of buildings based on the occupancy classification and type of construction, provided the special condition complies with the provisions specified in Section 510.

506.1.3 Basements. Basements need not be included in the total allowable floor area of a building provided the total area of such basements does not exceed the area permitted for a one-story above grade plane building.

506.2 Allowable area determination. The allowable area of a building shall be determined in accordance with the applicable provisions of Sections 506.2.1 through 506.2.4 and Section 506.3.

506.2.1 Single-occupancy, one-story buildings. The allowable area of a single-occupancy building with no more than one *story above grade plane* shall be determined in accordance with Equation 5-1:

$$A_a = A_t + (NS \times I_f) \qquad \textbf{(Equation 5-1)}$$

where:

A_a = Allowable area (square feet).

A_t = Tabular allowable area factor (NS, S1, S13R or S13D value, as applicable) in accordance with Table 506.2.

NS = Tabular allowable area factor in accordance with Table 506.2 for nonsprinklered building (regardless of whether the building is sprinklered).

I_f = Area factor increase due to frontage (percent) as calculated in accordance with Section 506.3.

[W][S] TABLE 506.2
ALLOWABLE AREA FACTOR (A_t = NS, S1, S13R, S13D or SM, as applicable) IN SQUARE FEET[a, b]

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION											
		TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
		A	B	A	B	A	B	A	B	C	HT	A	B
A-1	NS	UL	UL	15,500	8,500	14,000	8,500	45,000	30,000	18,750	15,000	11,500	5,500
	S1	UL	UL	62,000	34,000	56,000	34,000	180,000	120,000	75,000	60,000	46,000	22,000
	SM	UL	UL	46,500	25,500	42,000	25,500	135,000	90,000	56,250	45,000	34,500	16,500
A-2	NS	UL	UL	15,500	9,500	14,000	9,500	45,000	30,000	18,750	15,000	11,500	6,000
	S1	UL	UL	62,000	38,000	56,000	38,000	180,000	120,000	75,000	60,000	46,000	24,000
	SM	UL	UL	46,500	28,500	42,000	28,500	135,000	90,000	56,250	45,000	34,500	18,000
A-3	NS	UL	UL	15,500	9,500	14,000	9,500	45,000	30,000	18,750	15,000	11,500	6,000
	S1	UL	UL	62,000	38,000	56,000	38,000	180,000	120,000	75,000	60,000	46,000	24,000
	SM	UL	UL	46,500	28,500	42,000	28,500	135,000	90,000	56,250	45,000	34,500	18,000
A-4	NS	UL	UL	15,500	9,500	14,000	9,500	45,000	30,000	18,750	15,000	11,500	6,000
	S1	UL	UL	62,000	38,000	56,000	38,000	180,000	120,000	75,000	60,000	46,000	24,000
	SM	UL	UL	46,500	28,500	42,000	28,500	135,000	90,000	56,250	45,000	34,500	18,000
A-5	NS	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL
	S1												
	SM												
B	NS	UL	UL	37,500	23,000	28,500	19,000	108,000	72,000	45,000	36,000	18,000	9,000
	S1	UL	UL	150,000	92,000	114,000	76,000	432,000	288,000	180,000	144,000	72,000	36,000
	SM	UL	UL	112,500	69,000	85,500	57,000	324,000	216,000	135,000	108,000	54,000	27,000
E	NS	UL	UL	26,500	14,500	23,500	14,500	76,500	51,000	31,875	25,500	18,500	9,500
	S1	UL	UL	106,000	58,000	94,000	58,000	306,000	204,000	127,500	102,000	74,000	38,000
	SM	UL	UL	79,500	43,500	70,500	43,500	229,500	153,000	95,625	76,500	55,500	28,500
F-1	NS	UL	UL	25,000	15,500	19,000	12,000	100,500	67,000	41,875	33,500	14,000	8,500
	S1	UL	UL	100,000	62,000	76,000	48,000	402,000	268,000	167,500	134,000	56,000	34,000
	SM	UL	UL	75,000	46,500	57,000	36,000	301,500	201,000	125,625	100,500	42,000	25,500
F-2	NS	UL	UL	37,500	23,000	28,500	18,000	151,500	101,000	63,125	50,500	21,000	13,000
	S1	UL	UL	150,000	92,000	114,000	72,000	606,000	404,000	252,500	202,000	84,000	52,000
	SM	UL	UL	112,500	69,000	85,500	54,000	454,500	303,000	189,375	151,500	63,000	39,000
H-1	NS[c]	21,000	16,500	11,000	7,000	9,500	7,000	10,500	10,500	10,000	10,500	7,500	NP
	S1												
H-2	NS[c]	21,000	16,500	11,000	7,000	9,500	7,000	10,500	10,500	10,000	10,500	7,500	3,000
	S1												
	SM												
H-3	NS[c]	UL	60,000	26,500	14,000	17,500	13,000	25,500	25,500	25,500	25,500	10,000	5,000
	S1												
	SM												
H-4	NS[c, d]	UL	UL	37,500	17,500	28,500	17,500	72,000	54,000	40,500	36,000	18,000	6,500
	S1	UL	UL	150,000	70,000	114,000	70,000	288,000	216,000	162,000	144,000	72,000	26,000
	SM	UL	UL	112,500	52,500	85,500	52,500	216,000	162,000	121,500	108,000	54,000	19,500
H-5	NS[c, d]	UL	UL	37,500	23,000	28,500	19,000	72,000	54,000	40,500	36,000	18,000	9,000
	S1	UL	UL	150,000	92,000	114,000	76,000	288,000	216,000	162,000	144,000	72,000	36,000
	SM	UL	UL	112,500	69,000	85,500	57,000	216,000	162,000	121,500	108000	54,000	27,000
I-1	NS[d, e]	UL	55,000	19,000	10,000	16,500	10,000	54,000	36,000	18,000	18,000	10,500	4,500
	S1	UL	220,000	76,000	40,000	66,000	40,000	216,000	144,000	72,000	72,000	42,000	18,000
	SM	UL	165,000	57,000	30,000	49,500	30,000	162,000	108,000	54,000	54,000	31,500	13,500

[W][S] TABLE 506.2—continued
ALLOWABLE AREA FACTOR (A_t = NS, S1, S13R, S13D or SM, as applicable) IN SQUARE FEET[a, b]

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION											
		TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
		A	B	A	B	A	B	A	B	C	HT	A	B
I-2	NS[d, f]	UL	UL	15,000	11,000	12,000	NP	36,000	24,000	12,000	12,000	9,500	NP
	S1	UL	UL	60,000	44,000	48,000	NP	144,000	96,000	48,000	48,000	38,000	NP
	SM	UL	UL	45,000	33,000	36,000	NP	108,000	72,000	36,000	36,000	28,500	NP
I-3	NS[d, e]	UL	UL	15,000	10,000	10,500	7,500	36,000	24,000	12,000	12,000	7,500	5,000
	S1	UL	UL	45,000	40,000	42,000	30,000	144,000	96,000	48,000	48,000	30,000	20,000
	SM	UL	UL	45,000	30,000	31,500	22,500	108,000	72,000	36,000	36,000	22,500	15,000
I-4	NS[d, g]	UL	60,500	26,500	13,000	23,500	13,000	76,500	51,000	25,500	25,500	18,500	9,000
	S1	UL	121,000	106,000	52,000	94,000	52,000	306,000	204,000	102,000	102,000	74,000	36,000
	SM	UL	181,500	79,500	39,000	70,500	39,000	229,500	153,000	76,500	76,500	55,500	27,000
M	NS	UL	UL	21,500	12,500	18,500	12,500	61,500	41,000	25,625	20,500	14,000	9,000
	S1	UL	UL	86,000	50,000	74,000	50,000	246,000	164,000	102,500	82,000	56,000	36,000
	SM	UL	UL	64,500	37,500	55,500	37,500	184,500	123,000	76,875	61,500	42,000	27,000
R-1[h]	NS[d]	UL	UL	24,000	16,000	24,000	16,000	61,500	41,000	25,625	20,500	12,000	7,000
	S13R												
	S1	UL	UL	96,000	64,000	96,000	64,000	246,000	164,000	102,500	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	184,500	123,000	76,875	61,500	36,000	21,000
R-2[h]	NS[d]	UL	UL	24,000	16,000	24,000	16,000	61,500	41,000	25,625	20,500	12,000	7,000
	S13R												
	S1	UL	UL	96,000	64,000	96,000	64,000	246,000	164,000	102,500	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	184,500	120,000	76,875	61,500	36,000	21,000
R-3[h]	NS[d]	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL
	S13D												
	S13R												
	S1												
	SM												
((~~R-4[h]~~	~~NS[d]~~	~~UL~~	~~UL~~	~~24,000~~	~~16,000~~	~~24,000~~	~~16,000~~				~~20,500~~	~~12,000~~	~~7,000~~
	~~S13D~~												
	~~S13R~~												
	~~S1~~	~~UL~~	~~UL~~	~~96,000~~	~~64,000~~	~~96,000~~	~~64,000~~				~~82,000~~	~~48,000~~	~~28,000~~
	~~SM~~	~~UL~~	~~UL~~	~~72,000~~	~~48,000~~	~~72,000~~	~~48,000~~				~~61,500~~	~~36,000~~	~~21,000~~))
S-1	NS	UL	48,000	26,000	17,500	26,000	17,500	76,500	51,000	31,875	25,500	14,000	9,000
	S1	UL	192,000	104,000	70,000	104,000	70,000	306,000	204,000	127,500	102,000	56,000	36,000
	SM	UL	144,000	78,000	52,500	78,000	52,500	229,500	153,000	95,625	76,500	42,000	27,000
S-2	NS	UL	79,000	39,000	26,000	39,000	26,000	115,500	77,000	48,125	38,500	21,000	13,500
	S1	UL	316,000	156,000	104,000	156,000	104,000	462,000	308,000	192,500	154,000	84,000	54,000
	SM	UL	237,000	117,000	78,000	117,000	78,000	346,500	231,000	144,375	115,500	63,000	40,500
U	NS[i]	UL	35,500	19,000	8,500	14,000	8,500	54,000	36,000	22,500	18,000	9,000	5,500
	S1	UL	142,000	76,000	34,000	56,000	34,000	216,000	144,000	90,000	72,000	36,000	22,000
	SM	UL	106,500	57,000	25,500	42,000	25,500	162,000	108,000	67,500	54,000	27,000	16,500

For SI: 1 square foot = 0.0929 m^2.

UL = Unlimited; NP = Not Permitted; NS = Buildings not equipped throughout with an automatic sprinkler system; S1 = Buildings a maximum of one story above grade plane equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; SM = Buildings two or more stories above grade plane equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

a. See Chapter 4 for specific exceptions to the allowable area in this chapter.

b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.

c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.

d. The NS value is only for use in evaluation of existing building area in accordance with the *International Existing Building Code*.

e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies, Condition 1, see Exception 1 of Section 903.2.6.
f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and Section 1103.5 of the *International Fire Code*.
g. New Group I-4 occupancies see Exceptions 2 and 3 of Section 903.2.6.
h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.
i. The maximum allowable area for a single-story nonsprinklered Group U greenhouse is permitted to be 9,000 square feet, or the allowable area shall be permitted to comply with Table C102.1 of Appendix C.

506.2.2 Mixed-occupancy, one-story buildings. The allowable area of a mixed-occupancy building with no more than one *story above grade plane* shall be determined in accordance with the applicable provisions of Section 508.1 based on Equation 5-1 for each applicable occupancy.

506.2.2.1 Group H-2 or H-3 mixed occupancies. For a building containing Group H-2 or H-3 occupancies, the allowable area shall be determined in accordance with Section 508.4.2, with the sprinkler system increase applicable only to the portions of the building not classified as Group H-2 or H-3.

506.2.3 Single-occupancy, multistory buildings. The allowable area of a single-occupancy building with more than one *story above grade plane* shall be determined in accordance with Equation 5-2:

$A_a = [A_t + (NS \times I_f)] \times S_a$ **(Equation 5-2)**

where:

A_a = Allowable area (square feet).

A_t = Tabular allowable area factor (NS, S13R, S13D or SM value, as applicable) in accordance with Table 506.2.

NS = Tabular allowable area factor in accordance with Table 506.2 for a nonsprinklered building (regardless of whether the building is sprinklered).

I_f = Area factor increase due to frontage (percent) as calculated in accordance with Section 506.3.

S_a = Actual number of building *stories* above grade plane, not to exceed three. For buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.2, use the actual number of building *stories above grade plane*, not to exceed four.

No individual story shall exceed the allowable area (A_a) as determined by Equation 5-2 using the value of $S_a = 1$.

506.2.4 Mixed-occupancy, multistory buildings. Each story of a mixed-occupancy building with more than one *story above grade plane* shall individually comply with the applicable requirements of Section 508.1. For buildings with more than three *stories above grade plane*, the total building area shall be such that the aggregate sum of the ratios of the actual area of each *story* divided by the allowable area of such stories, determined in accordance with Equation 5-3 based on the applicable provisions of Section 508.1, shall not exceed three.

$A_a = [A_t + (NS \times I_f)]$ **(Equation 5-3)**

where:

A_a = Allowable area (square feet).

A_t = Tabular allowable area factor (NS, S13R, S13D or SM value, as applicable) in accordance with Table 506.2.

NS = Tabular allowable area factor in accordance with Table 506.2 for a nonsprinklered building (regardless of whether the building is sprinklered).

I_f = Area factor increase due to frontage (percent) as calculated in accordance with Section 506.3.

Exception: For buildings designed as separated occupancies under Section 508.4 and equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.2, the total building area shall be such that the aggregate sum of the ratios of the actual area of each *story* divided by the allowable area of such stories determined in accordance with Equation 5-3 based on the applicable provisions of Section 508.1, shall not exceed four.

506.2.4.1 Group H-2 or H-3 mixed occupancies. For a building containing Group H-2 or H-3 occupancies, the allowable area shall be determined in accordance with Section 508.4.2, with the sprinkler system increase applicable only to the portions of the building not classified as Group H-2 or H-3.

506.3 Frontage increase. Every building shall adjoin or have access to a public way to receive an area factor increase based on frontage. Area factor increase shall be determined in accordance with Sections 506.3.1 through 506.3.3.

506.3.1 Minimum percentage of perimeter. To qualify for an area factor increase based on frontage, a building shall have not less than 25 percent of its perimeter on a public way or open space. Such open space shall be either on the same lot or dedicated for public use and shall be accessed from a street or approved *fire lane*.

507.8.1.1.1 Liquid use, dispensing and mixing rooms. Liquid use, dispensing and mixing rooms having a floor area of not more than 500 square feet (46.5 m^2) need not be located on the outer perimeter of the building where they are in accordance with the *International Fire Code* and NFPA 30.

507.8.1.1.2 Liquid storage rooms. Liquid storage rooms having a floor area of not more than 1,000 square feet (93 m^2) need not be located on the outer perimeter where they are in accordance with the *International Fire Code* and NFPA 30.

507.8.1.1.3 Spray paint booths. Spray paint booths that comply with the *International Fire Code* need not be located on the outer perimeter.

507.8.2 Located on building perimeter. Except as provided for in Section 507.8.1.1, Group H occupancies shall be located on the perimeter of the building. In Group H-2 and H-3 occupancies, not less than 25 percent of the perimeter of such occupancies shall be an *exterior wall*.

507.8.3 Occupancy separations. Group H occupancies shall be separated from the remainder of the unlimited area building and from each other in accordance with Table 508.4.

507.8.4 Height limitations. For two-*story*, unlimited area buildings, Group H occupancies shall not be located more than one *story above grade plane* unless permitted based on the allowable height and number of *stories* and feet as specified in Section 504 based on the type of construction of the unlimited area building.

507.9 Unlimited mixed occupancy buildings with Group H-5. The area of a Group B, F, H-5, M or S building not more than two *stories above grade plane* shall not be limited where the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, and is surrounded and adjoined by *public ways* or *yards* not less than 60 feet (18 288 mm) in width, provided all of the following criteria are met:

1. Buildings containing Group H-5 occupancy shall be of Type I or II construction.
2. Each area used for Group H-5 occupancy shall be separated from other occupancies as required in Sections 415.11 and 508.4.
3. Each area used for Group H-5 occupancy shall not exceed the maximum allowable area permitted for such occupancies in Section 503.1 including modifications of Section 506.

   Exception: Where the Group H-5 occupancy exceeds the maximum allowable area, the Group H-5 shall be subdivided into areas that are separated by 2-hour fire barriers.

507.10 Aircraft paint hangar. The area of a Group H-2 aircraft paint hangar not more than one *story above grade plane* shall not be limited where such aircraft paint hangar complies with the provisions of Section 412.5 and is surrounded and adjoined by *public ways* or *yards* not less in width than one and one-half times the *building height*.

507.11 Group E buildings. The area of a Group E building not more than one *story above grade plane*, of Type II, IIIA or IV construction, shall not be limited provided all of the following criteria are met:

1. Each classroom shall have not less than two *means of egress*, with one of the *means of egress* being a direct *exit* to the outside of the building complying with Section 1022.
2. The building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.
3. The building is surrounded and adjoined by *public ways* or *yards* not less than 60 feet (18 288 mm) in width.

507.12 Motion picture theaters. In buildings of Type II construction, the area of a motion picture theater located on the first *story above grade plane* shall not be limited where the building is provided with an *automatic sprinkler system* throughout in accordance with Section 903.3.1.1 and is surrounded and adjoined by *public ways* or *yards* not less than 60 feet (18 288 mm) in width.

507.13 Covered and open mall buildings and anchor buildings. The area of *covered and open mall buildings* and *anchor buildings* not exceeding three *stories* in height that comply with Section 402 shall not be limited.

SECTION 508
MIXED USE AND OCCUPANCY

[S] 508.1 General. Each portion of a building shall be individually classified in accordance with Section 302.1. Where a building contains more than one occupancy group, the building or portion thereof shall comply with the applicable provisions of Section 508.2, 508.3 or 508.4, or a combination of these sections.

Exceptions:

1. Occupancies separated in accordance with Section 510.
2. Where required by Table 415.6.2, areas of Group H-1, H-2 and H-3 occupancies shall be located in a *detached building* or structure.

3. Uses within *live/work units*, complying with Section 419, are not considered separate occupancies.
4. Offices, mercantile, food preparation establishments for off-site consumption, personal care salons or similar uses in Group R *dwelling units*, which are conducted primarily by the occupants of a *dwelling unit* and are secondary to the use of the unit for dwelling purposes, and which do not exceed 500 square feet (46.4 m^2) are not considered a separate occupancy.

[S] 508.2 Accessory occupancies. Accessory occupancies are those occupancies that are ancillary to the main occupancy of the building or portion thereof. Accessory occupancies shall comply with the provisions of Sections 508.2.1 through 508.2.4.

508.2.1 Occupancy classification. Accessory occupancies shall be individually classified in accordance with Section 302.1. The requirements of this code shall apply to each portion of the building based on the occupancy classification of that space.

508.2.2 Allowable building height. The allowable height and number of *stories* of the building containing accessory occupancies shall be in accordance with Section 504 for the main occupancy of the building.

508.2.3 Allowable building area. The allowable area of the building shall be based on the applicable provisions of Section 506 for the main occupancy of the building. Aggregate accessory occupancies shall not occupy more than 10 percent of the floor area of the story in which they are located and shall not exceed the tabular values for nonsprinklered buildings in Table 506.2 for each such accessory occupancy.

508.2.4 Separation of accessory occupancies. No separation is required between accessory occupancies and the main occupancy.

Exceptions:

1. Group H-2, H-3, H-4 and H-5 occupancies shall be separated from all other occupancies in accordance with Section 508.4.
2. Group I-1, R-1, R-2 and R-3 *dwelling units* and *sleeping units* shall be separated from other *dwelling* or *sleeping units* and from accessory occupancies contiguous to them in accordance with the requirements of Section 420.

508.3 Nonseparated occupancies. Buildings or portions of buildings that comply with the provisions of this section shall be considered as nonseparated occupancies.

508.3.1 Occupancy classification. Nonseparated occupancies shall be individually classified in accordance with Section 302.1. The requirements of this code shall apply to each portion of the building based on the occupancy classification of that space. In addition, the most restrictive provisions of Chapter 9 that apply to the nonseparated occupancies shall apply to the total nonseparated occupancy area.

508.3.1.1 High-rise buildings. Where nonseparated occupancies occur in a *high-rise building*, the most restrictive requirements of Section 403 that apply to the nonseparated occupancies shall apply throughout the *high-rise building*.

508.3.1.2 Group I-2, Condition 2 occupancies. Where one of the nonseparated occupancies is Group I-2, Condition 2, the most restrictive requirements of Sections 407, 509 and 712 shall apply throughout the fire area containing the Group I-2 occupancy. The most restrictive requirements of Chapter 10 shall apply to the path of egress from the Group I-2, Condition 2 occupancy up to and including the exit discharge.

508.3.2 Allowable building area, height and number of stories. The allowable *building area, height* and number of *stories* of the building or portion thereof shall be based on the most restrictive allowances for the occupancy groups under consideration for the type of construction of the building in accordance with Section 503.1.

508.3.3 Separation. No separation is required between nonseparated occupancies.

Exceptions:

1. Group H-2, H-3, H-4 and H-5 occupancies shall be separated from all other occupancies in accordance with Section 508.4.
2. Group I-1, R-1, R-2 and R-3 *dwelling units* and *sleeping units* shall be separated from other *dwelling* or *sleeping units* and from other occupancies contiguous to them in accordance with the requirements of Section 420.

[S] 508.4 Separated occupancies. Buildings or portions of buildings that comply with the provisions of this section shall be considered as separated occupancies.

Exceptions:

1. No separation is required between Group A-2 or A-3 and Groups B or M occupancies when both are protected by an *automatic sprinkler system*.
2. Subject to the approval of the *building official*, unprotected openings are permitted in separations between parking areas and enclosed portions of buildings such as entry lobbies and similar areas provided:

   2.1. The floors of the enclosed *building* with unprotected openings are protected by an *automatic sprinkler system*;

   2.2. The openings are glazed with either tempered or laminated glazing materials;

2.3. When required by the *building official*, the glazing is protected on the parking side with a sprinkler system designed to wet the entire glazed surface; and

2.4. The parking areas are used primarily for passenger loading and unloading and vehicle drive-through uses.

508.4.1 Occupancy classification. Separated occupancies shall be individually classified in accordance with Section 302.1. Each separated space shall comply with this code based on the occupancy classification of that portion of the building. The most restrictive provisions of Chapter 9 that apply to the separate occupancies shall apply to the total nonfire-barrier-separated occupancy areas. Occupancy separations that serve to define fire area limits established in Chapter 9 for requiring a fire protection system shall also comply with Section 901.7.

508.4.2 Allowable building area. In each *story*, the *building area* shall be such that the sum of the ratios of the actual *building area* of each separated occupancy divided by the allowable *building* area of each separated occupancy shall not exceed 1.

508.4.3 Allowable building height and number of stories. Each separated occupancy shall comply with the *building height limitations* and *story* limitations based on the type of construction of the building in accordance with Section 503.1.

Exception: Special provisions of Section 510 shall permit occupancies at *building heights* and number of *stories* other than provided in Section 503.1.

508.4.4 Separation. Individual occupancies shall be separated from adjacent occupancies in accordance with Table 508.4.

[W] 508.4.4.1 Construction. Required separations shall be *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both, so as to completely separate adjacent occupancies. Mass timber elements serving as fire barriers or horizontal assemblies to separate occupancies in Type IV-B or IV-C construction shall be separated from the interior of the building with an approved thermal barrier consisting of a minimum of 1/2 inch (12.7 mm) gypsum board or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.

[S] TABLE 508.4
REQUIRED SEPARATION OF OCCUPANCIES (HOURS)[f]

OCCUPANCY	A, E		B[e]		I-1[a], I-3, I-4		I-2		R[a]		F-2, S-2[b], U		((~~B[e],~~)) F-1, ((~~M,~~)) S-1		M		H-1		H-2		H-3, H-4		H-5	
	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS
A, E	N	N	1	2	1	2	2	NP	1	2	N	1	1	2	1	2	NP	NP	3	4	2	3	2	NP
B[e]	—	—	N	N	1	2	2	NP	1	2	N	N	1	2	N	N	NP	NP	2	3	1	2	1	NP
I-1[a], I-3, I-4	—	—	—	—	N	N	2	NP	1	NP	1	2	1	2	1	2	NP	NP	3	NP	2	NP	2	NP
I-2	—	—	—	—	—	—	N	N	2	NP	2	NP	2	NP	2	NP	NP	NP	3	NP	2	NP	2	NP
R[a]	—	—	—	—	—	—	—	—	N	N	1[c]	2[c]	1	2	1	2	NP	NP	3	NP	2	NP	2	NP
F-2, S-2[b], U	—	—	—	—	—	—	—	—	—	—	N	N	1	2	1	2	NP	NP	3	4	2	3	2	NP
((~~B[e],~~)) F-1, ((~~M,~~)) S-1	—	—	—	—	—	—	—	—	—	—	—	—	N	N	N	N	NP	NP	2	3	1	2	1	NP
M	—	—	—	—	—	—	—	—	—	—	—	—	—	—	N	N	NP	NP	2	3	1	2	1	NP
H-1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	N	NP	NP	NP	NP	NP	NP	NP
H-2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	N	NP	1	NP	1	NP
H-3, H-4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1[d]	NP	1	NP
H-5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	N	NP

S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.
NS = Buildings not equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.
N = No separation requirement.
NP = Not Permitted.
a. See Section 420.
b. The required separation from areas used only for private or pleasure vehicles shall be reduced by 1 hour but not to less than 1 hour.
c. See Section 406.3.2.
d. Separation is not required between occupancies of the same classification.
e. See Section 422.2 for ambulatory care facilities.
f. Occupancy separations that serve to define fire area limits established in Chapter 9 for requiring fire protection systems shall also comply with Section 707.3.10 and Table 707.3.10 in accordance with Section 901.7.

SECTION 509
INCIDENTAL USES

509.1 General Incidental uses located within single occupancy or mixed occupancy buildings shall comply with the provisions of this section. Incidental uses are ancillary functions associated with a given occupancy that generally pose a greater level of risk to that occupancy and are limited to those uses listed in Table 509.

Exception: Incidental uses within and serving a *dwelling unit* are not required to comply with this section.

[F] TABLE 509
INCIDENTAL USES

ROOM OR AREA	SEPARATION AND/OR PROTECTION
Furnace room where any piece of equipment is over 400,000 Btu per hour input	1 hour or provide automatic sprinkler system
Rooms with boilers where the largest piece of equipment is over 15 psi and 10 horsepower	1 hour or provide automatic sprinkler system
Refrigerant machinery room	1 hour or provide automatic sprinkler system
Hydrogen fuel gas rooms, not classified as Group H	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.
Incinerator rooms	2 hours and provide automatic sprinkler system
Paint shops, not classified as Group H, located in occupancies other than Group F	2 hours; or 1 hour and provide automatic sprinkler system
In Group E occupancies, laboratories and vocational shops not classified as Group H	1 hour or provide automatic sprinkler system
In Group I-2 occupancies, laboratories not classified as Group H	1 hour and provide automatic sprinkler system
In ambulatory care facilities, laboratories not classified as Group H	1 hour or provide automatic sprinkler system
Laundry rooms over 100 square feet	1 hour or provide automatic sprinkler system
In Group I-2, laundry rooms over 100 square feet	1 hour
Group I-3 cells and Group I-2 patient rooms equipped with padded surfaces	1 hour
In Group I-2, physical plant maintenance shops	1 hour
In ambulatory care facilities or Group I-2 occupancies, waste and linen collection rooms with containers that have an aggregate volume of 10 cubic feet or greater	1 hour
In other than ambulatory care facilities and Group I-2 occupancies, waste and linen collection rooms over 100 square feet	1 hour or provide automatic sprinkler system
In ambulatory care facilities or Group I-2 occupancies, storage rooms greater than 100 square feet	1 hour
[S] Stationary storage battery systems having an aggregate liquid electrolyte energy capacity greater than the threshold quantity specified in Table 1206.2 of the *International Fire Code*	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.
Electrical installations and transformers	See Sections 110.26 through 110.34 and Sections 450.8 through 450.48 of NFPA 70 for protection and separation requirements.
[W] Dry type transformers over 112.5 kVA and required to be in a fire-resistance-rated room in accordance with Seattle Electrical Code Section 450.21 (B)[1]	1 hour or provide automatic sprinkler system
Elevator control and machine rooms	See Section 3020.4

For SI: 1 square foot = 0.0929 m^2, 1 pound per square inch (psi) = 6.9 kPa, 1 British thermal unit (Btu) per hour = 0.293 watts, 1 horsepower = 746 watts, 1 gallon = 3.785 L, 1 cubic foot = 0.0283 m^3.

[1] Dry type transformers rated over 35,000 volts and oil-insulated transformers shall be installed in a transformer vault complying with Section 430 and the Seattle Electrical Code.

509.2 Occupancy classification. Incidental uses shall not be individually classified in accordance with Section 302.1. Incidental uses shall be included in the building occupancies within which they are located.

Interpretation I509.2: For the purpose of this section, occupied roofs are considered floors used for human occupancy if the occupant load of the roof is ten or more on a building not equipped with an *automatic sprinkler system* or where the occupant load is 50 or more on the roof of a building that is equipped with an *automatic sprinkler system*.

[S] 509.3 Area limitations. Incidental uses shall not occupy more than 10 percent of the *building area* of the *story* in which they are located. Incidental uses that occupy more than 10 percent of the *building area* of the *story* in which they are located shall comply with either Table 509 or Section 508.4, whichever requires a greater separation.

509.4 Separation and protection. The incidental uses listed in Table 509 shall be separated from the remainder of the building or equipped with an *automatic sprinkler system*, or both, in accordance with the provisions of that table.

509.4.1 Separation. Where Table 509 specifies a fire-resistance-rated separation, the incidental uses shall be separated from the remainder of the *building* by a *fire barrier* constructed in accordance with Section 707 or a *horizontal assembly* constructed in accordance with Section 711, or both. Construction supporting 1-hour *fire barriers* or *horizontal assemblies* used for incidental use separations in buildings of Type IIB, IIIB and VB construction is not required to be fire-resistance rated unless required by other sections of this code.

[W] 509.4.1.1 Type IV-B and IV-C construction. Where Table 509 specifies a fire-resistance-rated separation, mass timber elements serving as fire barriers or a horizontal assembly in Type IV-B or IV-C construction shall be separated from the interior of the incidental use with an approved thermal barrier consisting of a minimum of 1/2 inch (12.7 mm) gypsum board or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.

509.4.2 Protection. Where Table 509 permits an *automatic sprinkler system* without a *fire barrier*, the incidental uses shall be separated from the remainder of the building by construction capable of resisting the passage of smoke. The walls shall extend from the top of the foundation or floor assembly below to the underside of the ceiling that is a component of a fire-resistance-rated floor assembly or roof assembly above or to the underside of the floor or roof sheathing, deck or slab above. Doors shall be self- or automatic-closing upon detection of smoke in accordance with Section 716.2.6.6. Doors shall not have air transfer openings and shall not be undercut in excess of the clearance permitted in accordance with NFPA 80. Walls surrounding the incidental use shall not have air transfer openings unless provided with smoke dampers in accordance with Section 710.8.

509.4.2.1 Protection limitation. Where an *automatic sprinkler system* is provided in accordance with Table 509, only the space occupied by the incidental use need be equipped with such a system.

SECTION 510
SPECIAL PROVISIONS

510.1 General. The provisions in Sections 510.2 through ((~~510.9~~)) 510.10 shall permit the use of special conditions that are exempt from, or modify, the specific requirements of this chapter regarding the allowable *building heights and areas* of buildings based on the occupancy classification and type of construction, provided the special condition complies with the provisions specified in this section for such condition and other applicable requirements of this code. The provisions of Sections 510.2 through ((~~510.8~~)) 510.7 are to be considered independent and separate from each other.

Interpretation I510.1: Sections 510.2 through 510.7 are not permitted to be used in combination with each other. Sections 510.8 through 510.10 are permitted to be used in combination with Section 510.2.

[W][S] 510.2 Horizontal building separation allowance. A building shall be considered as separate and distinct buildings for the purpose of determining area limitations, continuity of *fire walls*, limitation of number of *stories* and type of construction where all of the following conditions are met:

1. The buildings are separated with a *horizontal assembly* having a *fire-resistance rating* of not less than 3 hours. Where vertical offsets are provided as part of a horizontal assembly, the vertical offset and the structure supporting the vertical offset shall have a *fire-resistance rating* of not less than 3 hours.
2. The building below, including the *horizontal assembly*, is of Type IA construction.
3. *Shaft*, *stairway*, *ramp* and escalator enclosures through the *horizontal assembly* shall have not less than a 2-hour *fire-resistance rating* with opening protectives in accordance with Section 716.

   Exception: Where the enclosure walls below the *horizontal assembly* have not less than a 3-hour *fire-resistance rating* with opening protectives in accordance with Section 716, the enclosure walls extending above the *horizontal assembly* shall be permitted to have a 1-hour *fire-resistance rating*, provided:

   1. The building above the *horizontal assembly* is not required to be of Type I construction;
   2. The enclosure connects fewer than four *stories*; and

3. The enclosure opening protectives above the *horizontal assembly* have a *fire protection rating* of not less than 1 hour.

4. Interior exit stairways located within the Type IA building are permitted to be of combustible materials where both of the following requirements are met:

4.1. The building above the Type IA building is of Type III, IV, or V construction.

4.2. The stairway located in the Type IA building is enclosed by 3-hour *fire-resistance-rated* construction with opening protectives in accordance with Section 716.

((~~4~~)) 5. The building or buildings above the *horizontal assembly* shall be permitted to have ((~~multiple Group A occupancy uses, each with an *occupant load* of less 300, or Group B, M, R or S occupancies.~~)) any of the following occupancies:

5.1. One or more Group A occupancy uses, each with an occupant load of less than 300;

5.2. Group B;

5.3. Group I-1, Condition 2 licensed care facilities and residential treatment facilities;

5.4. Group M;

5.5. Group R;

5.6. Group S-2 parking garage used for the parking and storage of private motor vehicles; and

5.7. Uses incidental to the operation or serving occupants of the *building* (including entry lobbies, mechanical rooms, storage areas and similar uses).

((~~5~~)) 6. The building below the *horizontal assembly* ((~~shall be protected throughout by an *approved automatic sprinkler system* in accordance with Section 903.3.1.1, and shall be~~)) is permitted to be any occupancy allowed by this code except Group H.

((~~6~~)) 7. The maximum *building height* in feet (mm) shall not exceed the limits set forth in Section 504.3 for the building having the smaller allowable height as measured from the *grade plane*.

8. All portions of the *buildings* above and below the three-hour *horizontal assembly* shall be protected throughout with an *automatic sprinkler system* that complies with Section 903.3.1.1.

9. Occupied floors shall be not more than 75 feet above the lowest level of fire department vehicle access.

Interpretation I510.2: For the purpose of this item, occupied roof decks are considered floors used for human occupancy if the occupant load of the deck is 10 or more on the roof of a building not equipped with an *automatic sprinkler system* or where the occupant load is 50 or more on the roof of a *building* that is equipped with an *automatic sprinkler system.*

10. Interior exit stairways serving more than 6 *stories above grade plane* shall be pressurized in accordance with Section 909.20.6 for low-rise stairways.

510.3 Group S-2 enclosed parking garage with Group S-2 open parking garage above. A Group S-2 enclosed parking garage with not more than one *story* above *grade plane* and located below a Group S-2 *open parking garage* shall be classified as a separate and distinct building for the purpose of determining the type of construction where all of the following conditions are met:

1. The allowable area of the building shall be such that the sum of the ratios of the actual area divided by the allowable area for each separate occupancy shall not exceed 1.
2. The Group S-2 enclosed parking garage is of Type I or II construction and is at least equal to the *fire-resistance* requirements of the Group S-2 *open parking garage*.
3. The height and the number of tiers of the Group S-2 *open parking garage* shall be limited as specified in Table 406.5.4.
4. The floor assembly separating the Group S-2 enclosed parking garage and Group S-2 *open parking garage* shall be protected as required for the floor assembly of the Group S-2 enclosed parking garage. Openings between the Group S-2 enclosed parking garage and Group S-2 *open parking garage*, except *exit* openings, shall not be required to be protected.
5. The Group S-2 enclosed parking garage is used exclusively for the parking or storage of private motor vehicles, but shall be permitted to contain an office, waiting room and toilet room having a total area of not more than 1,000 square feet (93 m^2) and mechanical equipment rooms incidental to the operation of the building.

[S] 510.4 Parking beneath Group R. Where a maximum one *story above grade plane* Group S-2 parking garage, enclosed or open, or combination thereof, of Type I construction or open of Type IV-HT construction, with grade entrance, is provided under a building of Group R, the number of *stories* to be used in determining the minimum type of construction shall be measured from the floor above such a parking area. The floor assembly between the parking garage and the Group R above shall comply with the type of construction required for the parking garage and shall also provide a *fire-resistance rating* not less than the mixed occupancy separation required in Section 508.4. For purposes of this section, the Group R occupancy shall be no more than four *stories* in height.

((~~510.6~~)) 510.5 Group R-1 and R-2 buildings of Type IIA construction. The height limitation for buildings of Type IIA construction in Groups R-1 and R-2 shall be increased to nine *stories* and 100 feet (30 480 mm) where the building is separated by not less than 50 feet (15 240 mm) from any other building on the *lot* and from *lot lines*, the *exits* are segregated in an area enclosed by a 2-hour fire-resistance-rated *fire wall* and the first floor assembly has a *fire-resistance rating* of not less than 1-1/2 hours.

((~~510.7~~)) 510.6 Open parking garage beneath Groups A, I, B, M and R. *Open parking garages* constructed under Groups A, I, B, M and R shall not exceed the height and area limitations permitted under Section 406.5. The height and area of the portion of the building above the *open parking garage* shall not exceed the limitations in Section 503 for the upper occupancy. The height, in both feet and *stories*, of the portion of the building above the *open parking garage* shall be measured from *grade plane* and shall include both the *open parking garage* and the portion of the building above the parking garage.

((~~510.7.1~~)) 510.6.1 Fire separation. *Fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711 between the parking occupancy and the upper occupancy shall correspond to the required *fire-resistance rating* prescribed in Table 508.4 for the uses involved. The type of construction shall apply to each occupancy individually, except that structural members, including main bracing within the open parking structure, which is necessary to support the upper occupancy, shall be protected with the more restrictive fire-resistance-rated assemblies of the groups involved as shown in Table 601. *Means of egress* for the upper occupancy shall conform to Chapter 10 and shall be separated from the parking occupancy by *fire barriers* having not less than a 2-hour *fire-resistance rating* as required by Section 707 with *self-closing* doors complying with Section 716 or *horizontal assemblies* having not less than a 2-hour *fire-resistance rating* as required by Section 711, with *self-closing* doors complying with Section 716. *Means of egress* from the *open parking garage* shall comply with Section 406.5.

((~~510.8~~)) 510.7 Group B or M buildings with Group S-2 open parking garage above. Group B or M occupancies located below a Group S-2 open parking garage of a lesser type of construction shall be considered as a separate and distinct building from the Group S-2 *open parking garage* for the purpose of determining the type of construction where all of the following conditions are met:

1. The buildings are separated with a *horizontal assembly* having a *fire-resistance rating* of not less than 2 hours.
2. The occupancies in the building below the *horizontal assembly* are limited to Groups B and M.
3. The occupancy above the *horizontal assembly* is limited to a Group S-2 *open parking garage*.
4. The building below the *horizontal assembly* is of Type IA construction.

   Exception: The building below the *horizontal assembly* shall be permitted to be of Type IB or II construction, but not less than the type of construction required for the Group S-2 *open parking garage* above, where the building below is not greater than *one story* in height above grade plane.
5. The height and area of the building below the *horizontal assembly* does not exceed the limits set forth in Section 503.
6. The height and area of the Group S-2 *open parking garage* does not exceed the limits set forth in Section 406.5. The height, in both feet and *stories*, of the Group S-2 *open parking garage* shall be measured from *grade plane* and shall include the building below the *horizontal assembly*.
7. *Exits* serving the Group S-2 *open parking garage* discharge directly to a street or *public way* and are separated from the building below the *horizontal assembly* by 2-hour *fire barriers* constructed in accordance with Section 707 or 2-hour *horizontal assemblies* constructed in accordance with Section 711, or both.

((~~510.9~~)) 510.8 Multiple buildings above a horizontal assembly. Where two or more buildings are provided above the *horizontal assembly* separating a Group S-2 parking garage or building below from the buildings above in accordance with the special provisions in Section 510.2, 510.3 or ((~~510.8~~)) 510.7, the buildings above the *horizontal assembly* shall be regarded as separate and distinct buildings from each other and shall comply with all other provisions of this code as applicable to each separate and distinct building.

[W][S] ((~~510.5~~)) 510.9 Group R-1 and R-2 buildings of Type IIIA construction. ((~~The height limitation for~~)) For buildings of Type IIIA construction in Groups R-1 and R-2 the maximum allowable height in Table 504.4 shall be increased ((~~to six *stories* and 75 feet (22 860 mm)~~)) by one story where the first floor assembly above the *basement* has a *fire-resistance rating* of not less than 3 hours and the floor area is subdivided by 2-hour fire-resistance-rated *fire walls* into areas of not more than 3,000 square feet (279 m^2). **

510.10 Group R-2 buildings of Type IIIA construction. The height limitation for *buildings* of Type IIIA construction in Group R-2 shall be increased to six *stories* where all of the following conditions are met:

1. The first story of Type IIIA construction is separated from stories above with a *horizontal assembly* having a *fire-resistance rating* of not less than 2 hours. Fire-resistance rated mass timber is permitted in the horizontal assembly and its supporting structure.

2. All stories of Type IIIA construction greater than 6,000 gross square feet shall be subdivided into compartments, by 2-hour fire-resistance rated *fire walls*, with areas of not more than 12,000 gross square feet.
3. Each compartment shall have an enclosed *exit stairway*, and a standpipe in accordance with Section 905.
4. Unprotected vertical openings, including unenclosed interior *exit access stairways*, shall not penetrate floor/ceiling assemblies between stories of Type IIIA construction or between stories of Type IIIA and Type IA construction.
5. Mezzanines shall not be allowed in any story of the Type IIIA construction.
6. The maximum total design *dead load* shall be 50 psf for all roof areas above the sixth story of Type IIIA construction.

Note: The *dead load* shall be calculated as specified in Chapter 2 and Section 1607.13.3.1.

Note: The maximum total design *dead load* of 50 psf is permitted to be applied over the entire roof area above the sixth story of Type IIIA construction.

CHAPTER 6

TYPES OF CONSTRUCTION

User note:

About this chapter: *Chapter 6 establishes five types of construction in which each building must be categorized. This chapter looks at the materials used in the building (combustible or noncombustible) and the extent to which building elements such as building frame, roof, wall and floor can resist fire. Depending on the type of construction, the specific building element and its proximity to a lot line, fire resistance of 1 to 3 hours is specified.*

SECTION 601
GENERAL

601.1 Scope. The provisions of this chapter shall control the classification of buildings as to type of construction.

SECTION 602
CONSTRUCTION CLASSIFICATION

602.1 General. Buildings and structures erected or to be erected, altered or extended in height or area shall be classified in one of the five construction types defined in Sections 602.2 through 602.5. The building elements shall have a *fire-resistance rating* not less than that specified in Table 601 and exterior walls shall have a *fire-resistance rating* not less than that specified in Table 602. Where required to have a *fire-resistance rating* by Table 601, building elements shall comply with the applicable provisions of Section 703.2. The protection of openings, ducts and air transfer openings in building elements shall not be required unless required by other provisions of this code.

602.1.1 Minimum requirements. A building or portion thereof shall not be required to conform to the details of a type of construction higher than that type which meets the minimum requirements based on occupancy even though certain features of such a building actually conform to a higher type of construction.

[W] TABLE 601
FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Primary structural frame[f] (see Section 202)	3[a, b]	2[a, b]	1[b]	0	1[b]	0	3[a]	2[a]	2[a]	HT	1[b]	0
Bearing walls Exterior[e, f] Interior	 3 3[a]	 2 2[a]	 1 1	 0 0	 2 1	 2 0	 3 3	 2 2	 2 2	 2 1/HT	 1 1	 0 0
Nonbearing walls and partitions Exterior	See Table 602											
Nonbearing walls and partitions Interior[d]	0	0	0	0	0	0	0	0	0	See Section 2304.11.2	0	0
Floor construction and associated secondary members (see Section 202)	2[g]	2[g]	1	0	1	0	2	2	2	HT	1	0
Roof construction and associated secondary members (see Section 202)	1 1/2[b]	1[b,c]	1[b,c]	0[c]	1[b,c]	0	1 1/2	1	1	HT	1[b,c]	0

For SI: 1 foot = 304.8 mm.

a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.

b. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members in roof construction shall not be required, including protection of primary structural frame members, roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.

c. In all occupancies, heavy timber complying with Section 2304.11 shall be allowed where a 1-hour or less fire-resistance rating is required.

d. Not less than the fire-resistance rating required by other sections of this code.

e. Not less than the fire-resistance rating based on fire separation distance (see Table 602).

f. Not less than the fire-resistance rating as referenced in Section 704.10.

Note: See Sections 1019, 1023 and 603.1 item 27 for stairway construction.

g. The fire-resistance rating for mezzanines constructed in accordance with Section 505.2 need not exceed 1 hour.

[W] TABLE 602
FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE[a, d, g, j]

FIRE SEPARATION DISTANCE = X (feet)	TYPE OF CONSTRUCTION	OCCUPANCY GROUP H[e]	OCCUPANCY GROUP F-1, M, S-1[f]	OCCUPANCY GROUP A, B, E, F-2, I, R[i], S-2, U[h]
X < 5[b]	All	3	2	1
5 ≤ X < 10	IA, IVA, Others	3 2	2 1	1 1
10 ≤ X < 30	IA, IB, IVA, IVB, IIB, VB Others	2 1 1	1 0 1	1[c] 0 1[c]
X ≥ 30	All	0	0	0

For SI: 1 foot = 304.8 mm.
a. Load-bearing exterior walls shall also comply with the fire-resistance rating requirements of Table 601.
b. See Section 706.1.1 for party walls.
c. Open parking garages complying with Section 406 shall not be required to have a fire-resistance rating.
d. The fire-resistance rating of an exterior wall is determined based upon the fire separation distance of the exterior wall and the story in which the wall is located.
e. For special requirements for Group H occupancies, see Section 415.6.
f. For special requirements for Group S aircraft hangars, see Section 412.3.1.
g. Where Table 705.8 permits nonbearing exterior walls with unlimited area of unprotected openings, the required fire-resistance rating for the exterior walls is 0 hours.
h. For a building containing only a Group U occupancy private garage or carport, the exterior wall shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet (1523 mm) or greater.
i. For a Group R-3 building of Type II-B or Type V-B construction, the exterior wall shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet (1523 mm) or greater.
j. *Existing buildings* may encroach a maximum of 4 inches into the required *fire separation distance*, solely for the purpose of adding insulation to the building exterior.

602.2 Types I and II. Types I and II construction are those types of construction in which the building elements listed in Table 601 are of noncombustible materials, except as permitted in Section 603 and elsewhere in this code.

602.3 Type III. Type III construction is that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of any material permitted by this code. *Fire-retardant-treated wood* framing and sheathing complying with Section 2303.2 shall be permitted within *exterior wall* assemblies of a 2-hour rating or less.

Interpretation I602.3: Type IIIA buildings are permitted to include exposed heavy-timber construction for columns, beams, girders, arches, trusses, floors and roof decks except for fire-resistive construction required by Sections 510 and 713 and Chapter 10.

((~~**602.4 Type IV.** Type IV construction is that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of solid wood, laminated wood, heavy timber (HT) or structural composite lumber (SCL) without concealed spaces. The minimum dimensions for permitted materials including solid timber, glued-laminated timber, structural composite lumber (SCL), and cross-laminated timber and details of Type IV construction shall comply with the provisions of this section and Section 2304.11. Exterior walls complying with Section 602.4.1 or 602.4.2 shall be permitted. Interior walls and partitions not less than 1-hour fire-resistance rating or heavy timber complying with Section 2304.11.2.2 shall be permitted.~~)) *

[W] 602.4 Type IV. Type IV construction is that type of construction in which the building elements are mass timber or noncombustible materials and have fire-resistance ratings in accordance with Table 601. Mass timber elements shall meet the fire-resistance rating requirements of this section based on either the fire-resistance rating of the noncombustible protection, the mass timber, or a combination of both and shall be determined in accordance with Section 703.2 or 703.3. The minimum dimensions and permitted materials for building elements shall comply with the provisions of this section including Section 2304.11. Mass timber elements of Types IV-A, IV-B and IV-C construction shall be protected with noncombustible protection applied directly to the mass timber in accordance with Sections 602.4.1 through 602.4.3. The time assigned to the noncombustible protection shall be determined in accordance with Section 703.8 and comply with 722.7.

Cross-laminated timber shall be labeled as conforming to ANSI/APA PRG 320-18 as referenced in Section 2303.1.4.

Exterior load-bearing walls and non-load-bearing walls shall be mass timber construction or shall be of noncombustible construction.

EXCEPTION: Exterior load-bearing walls and non-load-bearing walls of Type IV-HT Construction in accordance with Section 602.4.4.

The interior building elements, including non-load-bearing walls and partitions, shall be of mass timber construction or of noncombustible construction.

EXCEPTION: Interior building elements and non-load-bearing walls and partitions of Type IV-HT Construction in accordance with Section 602.4.4.

Combustible concealed spaces are not permitted except as otherwise indicated in Sections 602.4.1 through 602.4.4. Combustible stud spaces within light frame walls of Type IV-HT construction shall not be considered concealed spaces, but shall comply with Section 718.

In buildings of Type IV-A, B, and C, construction with an occupied floor located more than 75 feet above the lowest level of fire department access, up to and including 12 stories or 180 feet above grade plane, mass timber interior exit and elevator hoistway enclosures shall be protected in accordance with Section 602.4.1.2. In buildings greater than 12 stories or 180 feet above grade plane, interior exit and elevator hoistway enclosures shall be constructed of noncombustible materials.

((~~**602.4.1 Fire-retardant-treated wood in exterior walls.** *Fire-retardant-treated wood* framing and sheathing complying with Section 2303.2 shall be permitted within exterior wall assemblies not less than 6 inches (152 mm) in thickness with a 2-hour rating or less.~~))

602.4.1 Type IV-A. Building elements in Type IV-A construction shall be protected in accordance with Sections 602.4.1.1 through 602.4.1.6. The required fire-resistance rating of noncombustible elements and protected mass timber elements shall be determined in accordance with Section 703.2 or Section 703.3.

602.4.1.1 Exterior protection. The outside face of exterior walls of mass timber construction shall be protected with noncombustible protection with a minimum assigned time of 40 minutes as determined in Section 722.7.1. All components of the exterior wall covering, shall be of noncombustible material except water resistive barriers having a peak heat release rate of less than 150 kW/m^2, a total heat release of less than 20 MJ/m^2 and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354 and having a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m^2.

602.4.1.2 Interior protection. Interior faces of all mass timber elements, including the inside faces of exterior mass timber walls and mass timber roofs, shall be protected with materials complying with Section 703.5.

602.4.1.2.1 Protection time. Noncombustible protection shall contribute a time equal to or greater than times assigned in Table 722.7.1(1), but not less than 80 minutes. The use of materials and their respective protection contributions listed in Table 722.7.1(2), shall be permitted to be used for compliance with Section 722.7.1.

602.4.1.3 Floors. The floor assembly shall contain a noncombustible material not less than 1 inch in thickness above the mass timber. Floor finishes in accordance with Section 804 shall be permitted on top of the noncombustible material. The underside of floor assemblies shall be protected in accordance with 602.4.1.2.

602.4.1.4 Roofs. The interior surfaces of roof assemblies shall be protected in accordance with Section 602.4.1.2. Roof coverings in accordance with Chapter 15 shall be permitted on the outside surface of the roof assembly.

602.4.1.5 Concealed spaces. Concealed spaces shall not contain combustibles other than electrical, mechanical, fire protection, or plumbing materials and equipment permitted in plenums in accordance with Section 602 of the International Mechanical Code, and shall comply with all applicable provisions of Section 718. Combustible construction forming concealed spaces shall be protected in accordance with Section 602.4.1.2.

602.4.1.6 Shafts. Shafts shall be permitted in accordance with Sections 713 and 718. Both the shaft side and room side of mass timber elements shall be protected in accordance with Section 602.4.1.2.

((~~**602.4.2 Cross laminated timber in exterior walls.** *Cross-laminated timber* complying with Section 2303.1.4 shall be permitted within exterior wall assemblies not less than 6 inches (152 mm) in thickness with a 2-hour rating or less, provided the exterior surface of the cross-laminated timber is protected by one the following:~~

~~1. *Fire-retardant-treated wood* sheathing complying with Section 2303.2 and not less than 15/32 inch (12 mm) thick;~~

~~2. *Gypsum board* not less than 1/2 inch (12.7 mm) thick; or~~

~~3. A noncombustible material.~~))

602.4.2 Type IV-B. Building elements in Type IV-B construction shall be protected in accordance with Sections 602.4.2.1 through 602.4.2.6. The required fire-resistance rating of noncombustible elements or mass timber elements shall be determined in accordance with Section 703.2 or 703.3.

602.4.2.1 Exterior protection. The outside face of exterior walls of mass timber construction shall be protected with noncombustible protection with a minimum assigned time of 40 minutes as determined in Section 722.7.1. All components of the exterior wall covering shall be of noncombustible material except water resistive barriers having a peak heat release rate of less than 150 kW/m^2, a total heat release of less than 20 MJ/m^2 and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354, and having a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m^2.

602.4.2.2 Interior protection. Interior faces of all mass timber elements, including the inside face of exterior mass timber walls and mass timber roofs, shall be protected, as required by this section, with materials complying with Section 703.5.

602.4.2.2.1 Protection time. Noncombustible protection shall contribute a time equal to or greater than times assigned in Table 722.7.1(1), but not less than 80 minutes. The use of materials and their respective protection contributions listed in Table 722.7.1(2), shall be permitted to be used for compliance with Section 722.7.1.

602.4.2.2.2 Protected area. All interior faces of all mass timber elements shall be protected in accordance with Section 602.4.2.2.1, including the inside face of exterior mass timber walls and mass timber roofs.

EXCEPTION: Unprotected portions of mass timber ceilings and walls complying with Section 602.4.2.2.4 and the following:

1. Unprotected portions of mass timber ceilings, including attached beams, shall be permitted and shall be limited to an area equal to 20% of the floor area in any dwelling unit or fire area; or
2. Unprotected portions of mass timber walls, including attached columns, shall be permitted and shall be limited to an area equal to 40% of the floor area in any dwelling unit or fire area; or
3. Unprotected portions of both walls and ceilings of mass timber, including attached columns and beams, in any dwelling unit or fire area shall be permitted in accordance with Section 602.4.2.2.3.
4. Mass timber columns and beams which are not an integral portion of walls or ceilings, respectively, shall be permitted to be unprotected without restriction of either aggregate area or separation from one another.

602.4.2.2.3 Mixed unprotected areas. In each dwelling unit or fire area, where both portions of ceilings and portions of walls are unprotected, the total allowable unprotected area shall be determined in accordance with Equation 6-1.

(Equation 6-1)

$$(Utc/Uac) + (Utw/Uaw) \leq 1$$

where:

Utc = Total unprotected mass timber ceiling areas;

Uac = Allowable unprotected mass timber ceiling area conforming to Section 602.4.2.2.2, Exception 1;

Utw = Total unprotected mass timber wall areas;

Uaw = Allowable unprotected mass timber wall area conforming to Section 602.4.2.2.2, Exception 2.

602.4.2.2.4 Separation distance between unprotected mass timber elements. In each dwelling unit or fire area, unprotected portions of mass timber walls and ceilings shall be not less than 15 feet from unprotected portions of other walls and ceilings, measured horizontally along the ceiling and from other unprotected portions of walls measured horizontally along the floor.

602.4.2.3 Floors. The floor assembly shall contain a noncombustible material not less than 1 inch in thickness above the mass timber. Floor finishes in accordance with Section 804 shall be permitted on top of the noncombustible material. The underside of floor assemblies shall be protected in accordance with Section 602.4.1.2.

602.4.2.4 Roofs. The interior surfaces of roof assemblies shall be protected in accordance with Section 602.4.2.2 except, in nonoccupiable spaces, they shall be treated as a concealed space with no portion left unprotected. Roof coverings in accordance with Chapter 15 shall be permitted on the outside surface of the roof assembly.

602.4.2.5 Concealed spaces. Concealed spaces shall not contain combustibles other than electrical, mechanical, fire protection, or plumbing materials and equipment permitted in plenums in accordance with Section 602 of the *International Mechanical Code*, and shall comply with all applicable provisions of Section 718. Combustible construction forming concealed spaces shall be protected in accordance with Section 602.4.1.2.

* **602.4.2.6 Shafts.** Shafts shall be permitted in accordance with Sections 713 and 718. Both the shaft side and room side of mass timber elements shall be protected in accordance with Section 602.4.1.2.

602.4.3 Type IV-C. Building elements in Type IV-C construction shall be protected in accordance with Sections 602.4.3.1 through 602.4.3.6. The required fire-resistance rating of building elements shall be determined in accordance with Sections 703.2 or 703.3.

602.4.3.1 Exterior protection. The exterior side of walls of combustible construction shall be protected with noncombustible protection with a minimum assigned time of 40 minutes as determined in Section 722.7.1. All components of the exterior wall covering, shall be of noncombustible material except water resistive barriers having a peak heat release rate of less than 150 kW/m^2, a total heat release of less than 20 MJ/m^2 and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354 and having a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m^2.

602.4.3.2 Interior protection. Mass timber elements are permitted to be unprotected.

602.4.3.3 Floors. Floor finishes in accordance with Section 804 shall be permitted on top of the floor construction.

602.4.3.4 Roofs. Roof coverings in accordance with Chapter 15 shall be permitted on the outside surface of the roof assembly.

602.4.3.5 Concealed spaces. Concealed spaces shall not contain combustibles other than electrical, mechanical, fire protection, or plumbing materials and equipment permitted in plenums in accordance with Section 602 of the International Mechanical Code, and shall comply with all applicable provisions of Section 718. Combustible construction forming concealed spaces shall be protected with noncombustible protection with a minimum assigned time of 40 minutes as determined in Section 722.7.1.

602.4.3.6 Shafts. Shafts shall be permitted in accordance with Sections 713 and 718. Shafts and elevator hoistway and interior exit stairway enclosures shall be protected with noncombustible protection with a minimum assigned time of 40 minutes as determined in Section 722.7.1, on both the inside of the shaft and the outside of the shaft.

[W] 602.4.4 Type IV-HT. Type IV-HT construction (Heavy Timber, HT) is that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of solid wood, laminated heavy timber or structural composite lumber (SCL), without concealed spaces. The minimum dimensions for permitted materials including solid timber, glued-laminated timber, structural composite lumber (SCL) and cross-laminated timber (CLT) and details of Type IV construction shall comply with the provisions of this section and section 2304.11. Exterior walls complying with Section 602.4.4.1 or 602.4.4.2 shall be permitted. Interior walls and partitions not less than 1 hour fire-resistance rating or heavy timber conforming with Section 2304.11.2.2 shall be permitted.

602.4.4.1 Fire-retardant-treated wood in exterior walls. Fire-retardant- treated wood framing and sheathing complying with Section 2303.2 shall be permitted within exterior wall assemblies not less than 6 inches (152 mm) in thickness with a 2-hour rating or less.

602.4.4.2 Cross-laminated timber in exterior walls. Cross-laminated timber complying with Section 2303.1.4 shall be permitted within exterior wall assemblies not less than 6 inches (152 mm) in thickness with a 2-hour rating or less, provided the exterior surface of the cross laminated timber is protected by one of the following:

1. Fire-retardant-treated wood sheathing complying with Section 2303.2 and not less than 15/32 inch (12 mm) thick;
2. Gypsum board not less than 1/2 inch (12.7 mm) thick; or
3. A noncombustible material.

602.4.4.3 Exterior structural members. Where a horizontal separation of 20 feet (6096 mm) or more is provided, wood columns and arches conforming to heavy timber sizes complying with Section 2304.11 shall be permitted to be used externally. **

602.5 Type V. Type V construction is that type of construction in which the structural elements, *exterior walls* and interior walls are of any materials permitted by this code.

Interpretation I602.5: Type VA buildings are permitted to include exposed heavy-timber construction for columns, beams, girders, arches, trusses, floors and roof decks except for fire-resistive construction required by Sections 510 and 713 and Chapter 10.

SECTION 603
COMBUSTIBLE MATERIAL IN TYPES I AND II CONSTRUCTION

[W][S] 603.1 Allowable materials. Combustible materials shall be permitted in buildings of Type I or II construction in the following applications and in accordance with Sections 603.1.1 through 603.1.3:

1. *Fire-retardant-treated wood* shall be permitted in:
   1.1. Nonbearing partitions where the required *fire-resistance rating* is 2 hours or less.
   1.2. Nonbearing *exterior walls* where fire-resistance-rated construction is not required.
   1.3. Roof construction, including girders, trusses, framing and decking.

   Exception: In buildings of Type IA construction exceeding two *stories above grade plane*, *fire-retardant-treated wood* is not permitted in roof construction where the vertical distance from the upper floor to the roof is less than 20 feet (6096 mm).

   1.4. Balconies, porches, decks and exterior stairways not used as required exits on buildings three stories or less above grade plane. Approved connector shall be per IBC 2304.10.5.
2. Thermal and acoustical insulation, other than foam plastics, having a *flame spread index* of not more than 25.

Exceptions:

1. Insulation placed between two layers of noncombustible materials without an intervening airspace shall be allowed to have a *flame spread index* of not more than 100.
2. Insulation installed between a finished floor and solid decking without intervening airspace shall be allowed to have a *flame spread index* of not more than 200.

3. Foam plastics in accordance with Chapter 26.
4. Roof coverings that have an A, B or C classification.
5. *Interior floor finish* and floor covering materials installed in accordance with Section 804.
6. Millwork such as doors, door frames, window sashes and frames.
7. *Interior wall and ceiling finishes* installed in accordance with Section 803.
8. *Trim* installed in accordance with Section 806.
9. Where not installed greater than 15 feet (4572 mm) above grade, show windows, nailing or furring strips and wooden bulkheads below show windows, including their frames, aprons and show cases.
10. Finish flooring installed in accordance with Section 805.
11. Partitions dividing portions of stores, offices or similar places occupied by one tenant only and that do not establish a *corridor* serving an *occupant load* of 30 or more shall be permitted to be constructed of *fire-retardant-treated wood*, 1-hour fire-resistance-rated construction or of wood panels or similar light construction up to 6 feet (1829 mm) in height.
12. Stages and platforms constructed in accordance with Sections 410.2 and 410.3, respectively.
13. Combustible *exterior wall coverings*, balconies and similar projections and bay or oriel windows in accordance with Chapter 14 and Section 705.2.3.1.
14. Blocking such as for handrails, millwork, cabinets and window and door frames.
15. Light-transmitting plastics as permitted by Chapter 26.
16. Mastics and caulking materials applied to provide flexible seals between components of *exterior wall* construction.
17. Exterior plastic veneer installed in accordance with Section 2605.2.
18. Nailing or furring strips as permitted by Section 803.15.
19. Heavy timber as permitted by Note c to Table 601 and Sections 602.4.3 and 705.2.3.1.
20. Aggregates, component materials and admixtures as permitted by Section 703.2.2.
21. Sprayed fire-resistant materials and intumescent and mastic fire-resistant coatings, determined on the basis of *fire resistance* tests in accordance with Section 703.2 and installed in accordance with Sections 1705.14 and 1705.15, respectively.
22. Materials used to protect penetrations in fire-resistance-rated assemblies in accordance with Section 714.
23. Materials used to protect joints in fire-resistance-rated assemblies in accordance with Section 715.
24. Materials allowed in the concealed spaces of buildings of Types I and II construction in accordance with Section 718.5.
25. Materials exposed within plenums complying with Section 602 of the *International Mechanical Code*.
26. Wall construction of freezers and coolers of less than 1,000 square feet (92.9 m^2), in size, lined on both sides with noncombustible materials and the building is protected throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.
27. Stairways within individual *dwelling units* and stairways serving a single tenant space are permitted to be of fire-retardant-treated wood or heavy-timber construction. In other than Group R occupancies, such stairways shall not serve as a required means of egress.
28. Stairways complying with Section 510.2, item 4.
29. Aluminum is permitted as follows:
    - 29.1. Where combustible materials, including fire retardant treated wood, are allowed by the code;
    - 29.2. For structural members supporting less than 500 square feet that do not have direct connections to columns and bracing members designed to carry gravity loads;
    - 29.3. In curtain walls *approved* or listed for use in non-combustible construction; and
    - 29.4. Unprotected aluminum frames for *awnings* in accordance with Section 3105.5.

603.1.1 Ducts. The use of nonmetallic ducts shall be permitted where installed in accordance with the limitations of the *International Mechanical Code*.

603.1.2 Piping. The use of combustible piping materials shall be permitted where installed in accordance with the limitations of the *International Mechanical Code* and the ((~~*International*~~)) *Uniform Plumbing Code*.

603.1.3 Electrical. The use of electrical wiring methods with combustible insulation, tubing, raceways and related components shall be permitted where installed in accordance with the limitations of this code.

CHAPTER 7

FIRE AND SMOKE PROTECTION FEATURES

User note:

About this chapter: *Chapter 7 provides detailed requirements for fire-resistance-rated construction, including structural members, walls, partitions and horizontal assemblies. Other portions of the code describe where certain fire-resistance-rated elements are required. This chapter specifies how these elements are constructed, how openings in walls and partitions are protected and how penetrations of such elements are protected.*

SECTION 701
GENERAL

[S] 701.1 Scope. The provisions of this chapter shall govern the materials, systems and assemblies used for structural *fire resistance* and fire-resistance-rated construction separation of adjacent spaces to safeguard against the spread of fire and smoke within a building and the spread of fire to or from buildings.

Exceptions:

1. Carports are not required to comply with this chapter if they satisfy all the following criteria:
   - 1.1. Accessory to Group R-3 occupancies.
   - 1.2. Used to shelter only vehicles, trailers or vessels.
   - 1.3. Constructed of metal, plastic or fabric.
   - 1.4. No more than 3 pounds per square foot in total weight.
   - 1.5. No more than 300 square feet covered area.
2. Temporary tents and similar structures are not required to comply with this chapter if they satisfy all the following criteria:
   - 2.1 The occupant load is less than 100;
   - 2.2 The structure is fully or partially enclosed and 400 square feet or less in area; or is entirely unenclosed and 700 square feet or less in area;
   - 2.3 The structure is constructed of metal, plastic or fabric; and
   - 2.4 The structure is no more than 3 pounds per square foot in total weight.

SECTION 702
MULTIPLE USE FIRE ASSEMBLIES

702.1 Multiple use fire assemblies. Fire assemblies that serve multiple purposes in a building shall comply with all of the requirements that are applicable for each of the individual fire assemblies.

SECTION 703
FIRE-RESISTANCE RATINGS AND FIRE TESTS

703.1 Scope. Materials prescribed herein for *fire resistance* shall conform to the requirements of this chapter.

703.2 Fire-resistance ratings. The *fire-resistance rating* of building elements, components or assemblies shall be determined in accordance with the test procedures set forth in ASTM E119 or UL 263 or in accordance with Section 703.3. The *fire-resistance rating* of penetrations and *fire-resistant joint systems* shall be determined in accordance Sections 714 and 715, respectively.

703.2.1 Nonsymmetrical wall construction. Interior walls and partitions of nonsymmetrical construction shall be tested with both faces exposed to the furnace, and the assigned *fire-resistance rating* shall be the shortest duration obtained from the two tests conducted in compliance with ASTM E119 or UL 263. Where evidence is furnished to show that the wall was tested with the least fire-resistant side exposed to the furnace, subject to acceptance of the *building official*, the wall need not be subjected to tests from the opposite side (see Section 705.5 for *exterior walls*).

703.2.2 Combustible components. Combustible aggregates are permitted in gypsum and Portland cement concrete mixtures for fire-resistance-rated construction. Any component material or admixture is permitted in assemblies if the resulting tested assembly meets the *fire-resistance* test requirements of this code.

703.2.3 Restrained classification. Fire-resistance-rated assemblies tested under ASTM E119 or UL 263 shall not be considered to be restrained unless evidence satisfactory to the *building official* is furnished by the *registered design professional* showing that the construction qualifies for a restrained classification in accordance with ASTM E119 or UL 263. Restrained construction shall be identified on the *construction documents*.

703.2.4 Supplemental features. Where materials, systems or devices that have not been tested as part of a fire-resistance-rated assembly are incorporated into the building element, component or assembly, sufficient data shall be made available to the *building official* to show that the required *fire-resistance rating* is not reduced.

703.2.5 Exterior bearing walls. In determining the *fire-resistance rating* of exterior bearing walls, compliance with the ASTM E119 or UL 263 criteria for unexposed surface temperature rise and ignition of cotton waste due to passage of flame or gases is required only for a period of time corresponding to the required *fire-resistance rating* of an exterior nonbearing wall with the same *fire separation distance*, and in a building of the same group. Where the *fire-resistance rating* determined in accordance with this exception exceeds the *fire-resistance rating* determined in accordance with ASTM E119 or UL 263, the fire exposure time period, water pressure and application duration criteria for the hose stream test of ASTM E119 or UL 263 shall be based on the *fire-resistance rating* determined in accordance with this section.

[S] 703.3 Methods for determining fire resistance. The application of any of the methods listed in this section shall be based on the fire exposure and acceptance criteria specified in ASTM E119 or UL 263. The required *fire resistance* of a building element, component or assembly shall be permitted to be established by any of the following methods or procedures:

1. *Fire-resistance* designs documented in approved sources.
2. Prescriptive designs of fire-resistance-rated building elements, components or assemblies as prescribed in Section 721.
3. Calculations in accordance with Section 722.
4. Engineering analysis based on a comparison of building element, component or assemblies designs having *fire-resistance ratings* as determined by the test procedures set forth in ASTM E119 or UL 263.
5. Alternative protection methods as allowed by Section ((~~104.11~~)) 104.5.
6. *Fire-resistance* designs certified by an approved agency.

703.4 Automatic sprinklers. Under the prescriptive fire-resistance requirements of this code, the *fire-resistance rating* of a building element, component or assembly shall be established without the use of *automatic sprinklers* or any other fire suppression system being incorporated as part of the assembly tested in accordance with the fire exposure, procedures and acceptance criteria specified in ASTM E119 or UL 263. However, this section shall not prohibit or limit the duties and powers of the *building official* allowed by Sections ((~~104.10~~)) 104.4 and ((~~104.11~~)) 104.5.

703.5 Noncombustibility tests. The tests indicated in Sections 703.5.1 and 703.5.2 shall serve as criteria for acceptance of building materials as set forth in Sections 602.2, 602.3 and 602.4 in Types I, II, III and IV construction. The term "noncombustible" does not apply to the flame spread characteristics of *interior finish* or *trim* materials. A material shall not be classified as a noncombustible building construction material if it is subject to an increase in combustibility or flame spread beyond the limitations herein established through the effects of age, moisture or other atmospheric conditions.

703.5.1 Elementary materials. Materials required to be noncombustible shall be tested in accordance with ASTM E136.

703.5.2 Composite materials. Materials having a structural base of noncombustible material as determined in accordance with Section 703.5.1 with a surfacing not more than 0.125 inch (3.18 mm) thick that has a *flame spread index* not greater than 50 when tested in accordance with ASTM E84 or UL 723 shall be acceptable as noncombustible materials.

703.6 Fire-resistance-rated glazing. Fire-resistance-rated glazing, when tested in accordance with ASTM E119 or UL 263 and complying with the requirements of Section 707, shall be permitted. Fire-resistance-rated glazing shall bear a *label* marked in accordance with Table 716.1(1) issued by an agency and shall be permanently identified on the glazing.

[S] 703.7 Marking and identification. Where there is an accessible concealed floor, floor-ceiling or *attic* space, *fire walls*, *fire barriers*, *fire partitions*, *smoke barriers* and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling in the concealed space. Such identification shall:

1. Be located within 15 feet (4572 mm) of the end of each wall and at intervals not exceeding 30 feet (9144 mm) measured horizontally along the wall or partition.
2. Include lettering not less than 3 inches (76 mm) in height with a minimum 3/8-inch (9.5 mm) stroke in a contrasting color incorporating the suggested wording, "FIRE AND/OR SMOKE BARRIER—PROTECT ALL OPENINGS," or other similar wording.

[W] 703.8 Determination of noncombustible protection time contribution. The time, in minutes, contributed to the fire-resistance rating by the noncombustible protection of mass timber building elements, components, or assemblies, shall be established through a comparison of assemblies tested using procedures set forth in ASTM E119 or UL 263. The test assemblies shall be identical in construction, loading, and materials, other than the noncombustible protection. The two test assemblies shall be tested to the same criteria of structural failure.

1. Test Assembly 1 shall be without protection.
2. Test Assembly 2 shall include the representative noncombustible protection. The protection shall be fully defined in terms of configuration details, attachment details, joint sealing details, accessories and all other relevant details.

The noncombustible protection time contribution shall be determined by subtracting the fire resistance time, in minutes, of Test Assembly 1 from the fire resistance time, in minutes, of Test Assembly 2.

[W] 703.9 Sealing of adjacent mass timber elements. In buildings of Type IV-A, IV-B, and IV-C construction, sealant or adhesive shall be provided to resist the passage of air in the following locations:

1. At abutting edges and intersections of mass timber building elements required to be fire-resistance-rated.
2. At abutting intersections of mass timber building elements and building elements of other materials where both are required to be fire-resistance-rated.

Sealants shall meet the requirements of ASTM C920. Adhesives shall meet the requirements of ASTM D3498.

SECTION 704
FIRE-RESISTANCE RATING OF STRUCTURAL MEMBERS

704.1 Requirements. The *fire-resistance ratings* of structural members and assemblies shall comply with this section and the requirements for the type of construction as specified in Table 601. The *fire-resistance ratings* shall be not less than the ratings required for the fire-resistance-rated assemblies supported by the structural members.

Exception: *Fire barriers*, *fire partitions*, *smoke barriers* and *horizontal assemblies* as provided in Sections 707.5, 708.4, 709.4 and 711.2, respectively.

704.2 Column protection. Where columns are required to have protection to achieve a *fire-resistance rating*, the entire column shall be provided individual encasement protection by protecting it on all sides for the full column height, including connections to other structural members, with materials having the required *fire-resistance rating*. Where the column extends through a ceiling, the encasement protection shall be continuous from the top of the foundation or floor/ceiling assembly below through the ceiling space to the top of the column.

Exception: Columns that meet the limitations of Section 704.4.1.

704.3 Protection of the primary structural frame other than columns. Members of the primary structural frame other than columns that are required to have protection to achieve a *fire-resistance rating* and support more than two floors or one floor and roof, or support a load-bearing wall or a nonload-bearing wall more than two stories high, shall be provided individual encasement protection by protecting them on all sides for the full length, including connections to other structural members, with materials having the required *fire-resistance rating*.

Exception: Individual encasement protection on all sides shall be permitted on all exposed sides provided that the extent of protection is in accordance with the required *fire-resistance rating*, as determined in Section 703.

704.4 Protection of secondary members. Secondary members that are required to have protection to achieve a *fire-resistance rating* shall be protected by individual encasement protection.

704.4.1 Light-frame construction. Studs, columns and boundary elements that are integral elements in *walls* of light-frame construction and are located entirely between the top and bottom plates or tracks shall be permitted to have required *fire-resistance ratings* provided by the membrane protection provided for the *wall*.

[S] 704.4.2 Horizontal assemblies. ((~~*Horizontal*~~)) *Secondary members* within horizontal *assemblies* are permitted to be protected with a membrane or ceiling where the membrane or ceiling provides the required *fire-resistance rating* and is installed in accordance with Section 711.

704.5 Truss protection. The required thickness and construction of fire-resistance-rated assemblies enclosing trusses shall be based on the results of full-scale tests or combinations of tests on truss components or on *approved* calculations based on such tests that satisfactorily demonstrate that the assembly has the required *fire resistance*.

704.6 Attachments to structural members. The edges of lugs, brackets, rivets and bolt heads attached to structural members shall be permitted to extend to within 1 inch (25 mm) of the surface of the fire protection.

[W] 704.6.1 Secondary (nonstructural) attachments to structural members. Where primary and secondary structural steel members require fire protection, secondary (nonstructural) tubular steel attachments to those structural members shall be protected with the same fire resistive rating as required for the structural member. The protection shall extend from the structural member a distance of not less than 12 inches. An open tubular attachment shall be filled with an equivalent fire protection method for a distance of 12-inch length from the structural member, or the entire length of the open tube, whichever is less.

704.7 Reinforcing. Thickness of protection for concrete or masonry reinforcement shall be measured to the outside of the reinforcement except that stirrups and spiral reinforcement ties are permitted to project not more than 0.5-inch (12.7 mm) into the protection.

SECTION 705
EXTERIOR WALLS AND PROJECTIONS

[W] 705.1 General. *Exterior walls* and *projections* shall comply with this section.

[W][S] 705.2 Projections. Cornices, eave overhangs, exterior balconies and similar projections extending beyond the ((~~exterior wall~~)) *building area* shall conform to the requirements of this section and Section 1405. Exterior egress balconies and exterior exit stairways and ramps shall comply with Sections 1021 and 1027, respectively. Projections shall not extend any closer to the line used to determine the *fire separation distance* than shown in Table 705.2.

Exception: Buildings on the same lot and considered as portions of one building in accordance with Section 705.3 are not required to comply with this section for projections between the buildings.

TABLE 705.2
MINIMUM DISTANCE OF PROJECTION

FIRE SEPARATION DISTANCE-FSD (feet)	MINIMUM DISTANCE FROM LINE USED TO DETERMINE FSD
0 to less than 2	Projections not permitted
2 to less than 3	24 inches
3 to less than 5	24 inches plus 8 inches for every foot of FSD beyond 3 feet or fraction thereof
5 or greater	40 inches

For SI: 1 foot = 304.8 mm; 1 inch = 25.4 mm.

Code Alternate CA705.2: Private balconies and decks constructed with grated metal decking that allows smoke and heat to ventilate are permitted to be considered projections and not floor area. Noncombustible exterior structure supporting only the grated balcony or deck is not required to be fire-resistance rated. Exterior exposed noncombustible columns supporting the grated decks are not required to be fire-resistance rated.

Interpretation I705.2: For purposes of Section 705.2, gutters 6 inches or less in width that are not an integral part of the structure are not considered projections on Group R-3 occupancies and on Group U accessory occupancies.

705.2.1 Types I and II construction. Projections from walls of Type I or II construction shall be of noncombustible materials or combustible materials as allowed by Sections 705.2.3.1 and 705.2.4.

705.2.2 Type III, IV or V construction. Projections from walls of Type III, IV or V construction shall be of any *approved* material.

Eave overhangs from walls of Types IIIA, IV or VA construction or from walls that are otherwise required to be of *fire-resistance-rated* construction shall be finished on the underside with at least 1/2-inch (13 mm) gypsum sheathing or equivalent or shall be heavy-timber construction conforming to Section 602.4. Vents are permitted to be installed if the vent openings are covered with corrosion–resistant metal mesh.

See Section 714.5.2 for allowable vent penetrations.

705.2.3 Combustible projections. Combustible projections extending to within 5 feet (1524 mm) of the line used to determine the *fire separation distance* shall be of not less than 1-hour *fire-resistance-rated* construction, heavy timber construction, complying with Section 2304.11, *fire-retardant-treated wood* or as permitted by Section 705.2.3.1.

Exceptions:

1. Type VB construction shall be allowed for combustible projections in Group R-3 and U occupancies with a *fire separation distance* greater than or equal to 5 feet (1524 mm).
2. Eave overhangs are permitted to be of less than one-hour construction provided the underside is finished with at least 1/2-inch (13 mm) gypsum sheathing or equivalent.

705.2.3.1 Balconies and similar projections. Balconies and similar projections of combustible construction other than fire-retardant-treated wood shall be fire-resistance rated where required by Table 601 for floor construction or shall be of ((~~heavy timber~~)) Type IV construction in accordance with Section 2304.11. The aggregate length of the projections shall not exceed 50 percent of the building's perimeter on each floor. **

Exceptions:

1. On buildings of Types I and II construction, three stories or less above grade plane, fire-retardant-treated wood shall be permitted for balconies, porches, decks and exterior stairways not used as required exits.
2. Untreated wood and plastic composites that comply with ASTM D7032 and Section 2612 are permitted for pickets, rails and similar guard components that are limited to 42 inches (1067 mm) in height.
3. Balconies and similar projections on buildings of Types III, IV and V construction shall be permitted to be of Type V construction and shall not be required to have a *fire-resistance rating* where sprinkler protection is extended to these areas.

4. Where sprinkler protection is extended to the balcony areas, the aggregate length of the balcony on each floor shall not be limited.

705.2.4 Bay and oriel windows. Bay and oriel windows constructed of combustible materials shall conform to the type of construction required for the building to which they are attached.

Exception: Fire-retardant-treated wood shall be permitted on buildings three stories or less above grade plane of Type I, II, III or IV construction.

[S] 705.3 Buildings on the same lot. For the purposes of determining the required wall and opening protection, projections and roof-covering requirements, buildings on the same lot shall be assumed to have an imaginary line between them.

Where a new building is to be erected on the same lot as an existing building, the location of the assumed imaginary line with relation to the existing building shall be such that the *exterior wall* and opening protection of the existing building meet the criteria as set forth in Sections 705.5 and 705.8.

Exceptions:

1. Two or more buildings on the same lot shall be either regulated as separate buildings or shall be considered as portions of one building if the aggregate area of such buildings is within the limits specified in Chapter 5 for a single building. Where the buildings contain different occupancy groups or are of different types of construction, the area shall be that allowed for the most restrictive occupancy or construction.
2. Where an S-2 parking garage of Construction Type I or IIA is erected on the same lot as a Group R-2 building, and ((~~there is no *fire separation distance* between these buildings~~)) where openings are not permitted or are required by this code to be protected, then the adjoining *exterior walls* between the buildings are permitted to have occupant use openings in accordance with Section 706.8. However, opening protectives in such openings shall only be required in the exterior wall of the S-2 parking garage, not in the exterior wall openings in the R-2 building, and these opening protectives in the exterior wall of the S-2 parking garage shall be not less than 1 1/2-hour *fire protection rating*.

705.4 Materials. *Exterior walls* shall be of materials permitted by the building type of construction.

705.5 Fire-resistance ratings. *Exterior walls* shall be fire-resistance rated in accordance with Tables 601 and 602 and this section. The required *fire-resistance rating* of *exterior walls* with a *fire separation distance* of greater than 10 feet (3048 mm) shall be rated for exposure to fire from the inside. The required *fire-resistance rating* of *exterior walls* with a *fire separation distance* of less than or equal to 10 feet (3048 mm) shall be rated for exposure to fire from both sides.

705.6 Structural stability. *Exterior walls* shall extend to the height required by Section 705.11. Interior structural elements that brace the exterior wall but that are not located within the plane of the exterior wall shall have the minimum *fire-resistance rating* required in Table 601 for that structural element. Structural elements that brace the exterior wall but are located outside of the exterior wall or within the plane of the exterior wall shall have the minimum *fire-resistance rating* required in Tables 601 and 602 for the exterior wall.

705.7 Unexposed surface temperature. Where protected openings are not limited by Section 705.8, the limitation on the rise of temperature on the unexposed surface of *exterior walls* as required by ASTM E119 or UL 263 shall not apply. Where protected openings are limited by Section 705.8, the limitation on the rise of temperature on the unexposed surface of *exterior walls* as required by ASTM E119 or UL 263 shall not apply provided that a correction is made for radiation from the unexposed *exterior wall* surface in accordance with the following formula:

$$A_e = A + (A_f \times F_{eo})$$ **(Equation 7-1)**

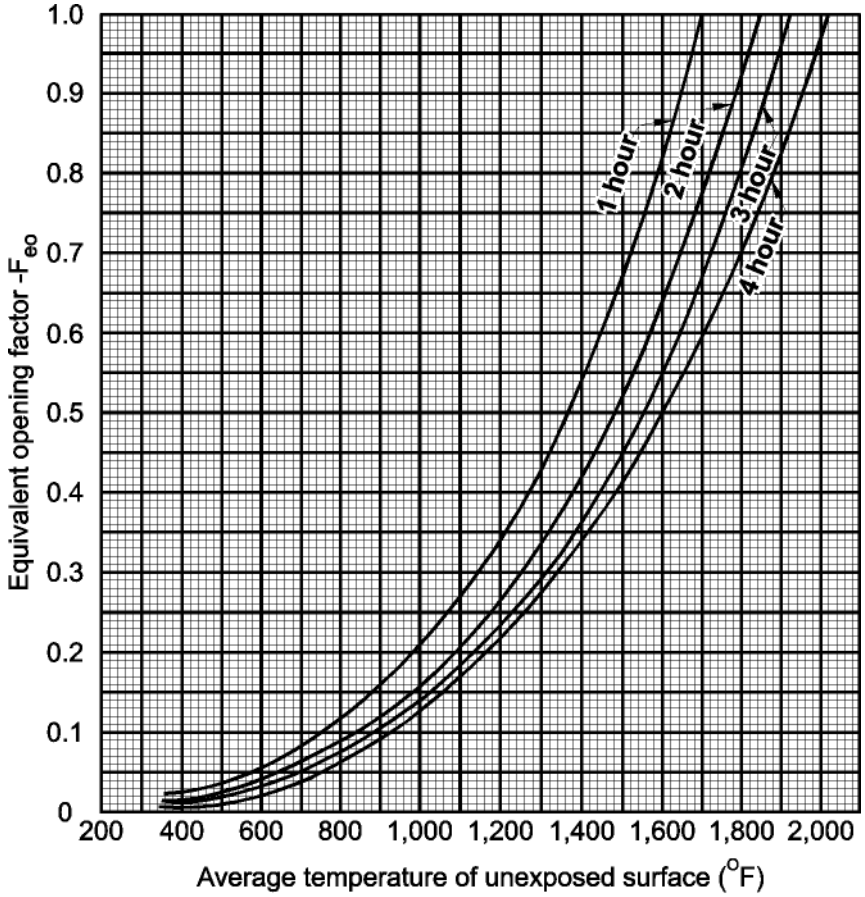
where:

A_e = Equivalent area of protected openings.

A = Actual area of protected openings.

A_f = Area of *exterior wall* surface in the *story* under consideration exclusive of openings, on which the temperature limitations of ASTM E119 or UL 263 for walls are exceeded.

F_{eo} = An "equivalent opening factor" derived from Figure 705.7 based on the average temperature of the unexposed wall surface and the *fire-resistance rating* of the wall.



For SI: °C = [(°F) - 32] / 1.8.

FIGURE 705.7
EQUIVALENT OPENING FACTOR

[S] 705.8 Openings. Openings in *exterior walls* shall comply with Sections 705.8.1 through 705.8.6. For spaces that are not provided with *exterior walls*, the vertical plane at the edge of the horizontal projection of the roof or floor is considered an exterior wall.

[S] TABLE 705.8
MAXIMUM AREA OF EXTERIOR WALL OPENINGS BASED ON FIRE SEPARATION DISTANCE AND DEGREE OF OPENING PROTECTION

FIRE SEPARATION DISTANCE (feet)[l]	DEGREE OF OPENING PROTECTION	ALLOWABLE AREA[a]
0 to less than 3[b, c, k]	Unprotected, Nonsprinklered (UP, NS)	Not Permitted[k]
	Unprotected, Sprinklered (UP, S)[i]	Not Permitted[k]
	Protected (P)	Not Permitted[k]
3 to less than 5[d, e]	Unprotected, Nonsprinklered (UP, NS)	Not Permitted
	Unprotected, Sprinklered (UP, S)[i]	15%
	Protected (P)	15%
5 to less than 10[e, f, j]	Unprotected, Nonsprinklered (UP, NS)	10%[h]
	Unprotected, Sprinklered (UP, S)[i]	25%
	Protected (P)	25%
10 to less than 15[e, f, g, j]	Unprotected, Nonsprinklered (UP, NS)	15%[h]
	Unprotected, Sprinklered (UP, S)[i]	45%
	Protected (P)	45%
15 to less than 20[f, g, j]	Unprotected, Nonsprinklered (UP, NS)	25%
	Unprotected, Sprinklered (UP, S)[i]	75%
	Protected (P)	75%
20 to less than 25[f, g, j]	Unprotected, Nonsprinklered (UP, NS)	45%
	Unprotected, Sprinklered (UP, S)[i]	No Limit
	Protected (P)	No Limit
25 to less than 30[f, g, j]	Unprotected, Nonsprinklered (UP, NS)	70%
	Unprotected, Sprinklered (UP, S)[i]	No Limit
	Protected (P)	No Limit
30 or greater	Unprotected, Nonsprinklered (UP, NS)	No Limit
	Unprotected, Sprinklered (UP, S)[i]	No Limit
	Protected (P)	No Limit

For SI: 1 foot = 304.8 mm.
UP, NS = Unprotected openings in buildings not equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
UP, S = Unprotected openings in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
P = Openings protected with an opening protective assembly in accordance with Section 705.8.2.

a. Values indicated are the percentage of the area of the exterior wall, per story.
b. For the requirements for fire walls of buildings with differing heights, see Section 706.6.1.
c. For openings in a fire wall for buildings on the same lot, see Section 706.8.
d. The maximum percentage of unprotected and protected openings shall be 25 percent for Group R-3 occupancies.
e. Unprotected openings shall not be permitted for openings with a fire separation distance of less than 15 feet for Group H-2 and H-3 occupancies.
f. The area of unprotected and protected openings shall not be limited for Group R-3 occupancies, with a fire separation distance of 5 feet or greater.
g. The area of openings in an open parking structure with a fire separation distance of 10 feet or greater shall not be limited.
h. Includes buildings accessory to Group R-3.
i. Not applicable to Group H-1, H-2 and H-3 occupancies.
j. The area of openings in a building containing only a Group U occupancy private garage or carport with a fire separation distance of 5 feet or greater shall not be limited.
k. For openings between S-2 parking garage and Group R-2 building, see Section 705.3, Exception 2.
l. For the purpose of calculating the maximum area of *exterior wall* openings on *existing buildings*, the *fire separation distances* indicated in the chart may be reduced by a maximum of 4 inches, solely for the purpose of adding insulation to the building exterior.

Interpretation I705.8: For purposes of Section 705.8, where the *fire separation distance* on a lower floor is greater than the *fire separation distance* on the floor above creating an overhang, there are two options for wall, soffit, and opening protection. The fire-resistance rating of the soffit shall be no less than required rating for floor construction by Table 601.

Option 1: The plane that projects vertically from the edge of the *story*, roof or deck above shall comply with the exterior wall and opening protection requirements. The portion of the plane where the wall is recessed is considered an opening. The fire-resistance rating of the soffit shall be no less than required rating for the recessed exterior wall.

Option 2: Recessed *exterior walls* shall comply with the wall fire rating and wall opening protection percentages as if the *fire separation distance* is equal to the *story*, roof or deck above. The soffit shall be fire-resistance rated not less than as required for the recessed exterior wall. The use of the recessed area underneath the protected overhang is restricted to egress or circulation.

See Figures I705.8a and I705.8b.

Interpretation I705.8:
Option 1. Exterior wall protection extends from A to B to C.
Option 2. Exterior wall protection extends from A to B to B1 to C1. Fire-resistance rating and opening protection for wall B-B1-C1, and fire-resistance rating at soffit B-B1-C1-C comply with requirements for wall B-C. The length of the wall segment B-B1 shall be included when calculating the percentage of openings allowed.

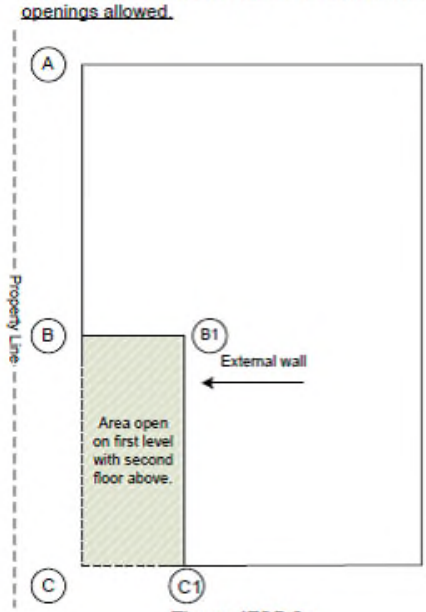


Figure I705.8a
Plan View

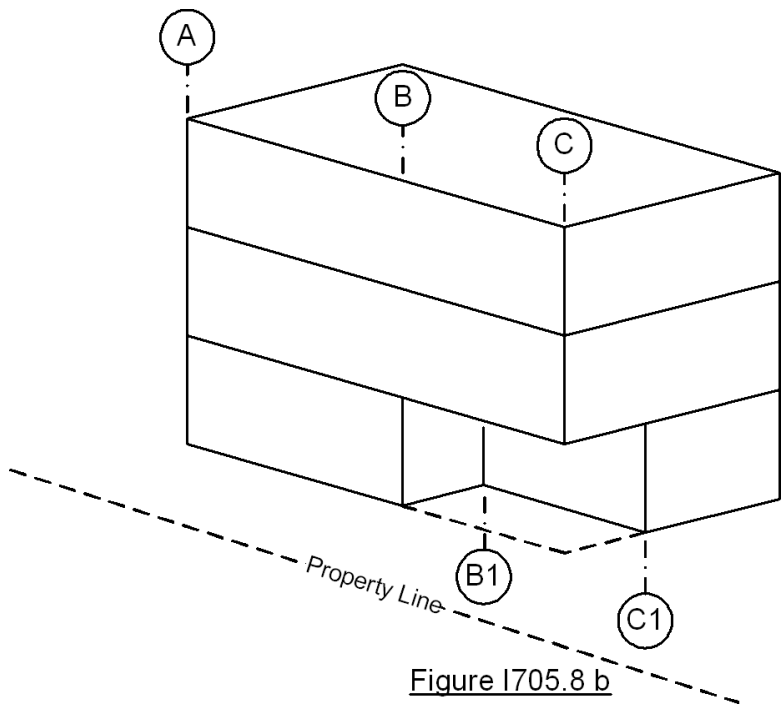


Figure I705.8 b

Note: Opening protection in wall C to C1 isn't considered in Figures I705.8a and I705.8b because it is perpendicular to the property line.

705.8.1 Allowable area of openings. The maximum area of unprotected and protected openings permitted in an *exterior wall* in any *story* of a building shall not exceed the percentages specified in Table 705.8 based on the *fire separation distance* of each individual story.

Exceptions:

1. In other than Group H occupancies, unlimited unprotected openings are permitted in the first *story* above grade plane where the wall faces one of the following:
   1.1. A street and has a *fire separation distance* of more than ((~~15~~)) 30 feet (((~~4572~~)) 9144 mm).
   1.2. An unoccupied space. The unoccupied space shall be on the same lot or dedicated for public use, shall be not less than 30 feet (9144 mm) in width and shall have access from a street by a posted fire lane in accordance with the *International Fire Code.*

2. Buildings whose exterior bearing walls, exterior nonbearing walls and exterior primary structural frame are not required to be fire-resistance rated shall be permitted to have unlimited unprotected openings.

705.8.2 Protected openings. Where openings are required to be protected, opening protectives shall comply with Section 716.

Exception: Opening protectives are not required where the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 and the exterior openings are protected by a water curtain using automatic sprinklers *approved* for that use.

705.8.3 Unprotected openings. Where unprotected openings are permitted, windows and doors shall be constructed of any *approved* materials. Glazing shall conform to the requirements of Chapters 24 and 26.

705.8.4 Mixed openings. Where both unprotected and protected openings are located in the *exterior wall* in any *story* of a building, the total area of openings shall be determined in accordance with the following:

$(A_p/a_p) + (A_u/a_u) \leq 1$ **(Equation 7-2)**

where:

A_p = Actual area of protected openings, or the equivalent area of protected openings, A_e (see Section 705.7).

a_p = Allowable area of protected openings.

A_u = Actual area of unprotected openings.

a_u = Allowable area of unprotected openings.

705.8.5 Vertical separation of openings. Openings in *exterior walls* in adjacent *stories* shall be separated vertically to protect against fire spread on the exterior of the buildings where the openings are within 5 feet (1524 mm) of each other horizontally and the opening in the lower *story* is not a protected opening with a *fire protection rating* of not less than 3/4 hour. Such openings shall be separated vertically not less than 3 feet (914 mm) by spandrel girders, *exterior walls* or other similar assemblies that have a *fire-resistance rating* of not less than 1 hour, rated for exposure to fire from both sides, or by flame barriers that extend horizontally not less than 30 inches (762 mm) beyond the *exterior wall*. Flame barriers shall have a *fire-resistance rating* of not less than 1 hour. The unexposed surface temperature limitations specified in ASTM E119 or UL 263 shall not apply to the flame barriers unless otherwise required by the provisions of this code.

Exceptions:

1. This section shall not apply to buildings that are three *stories* or less above *grade plane*.
2. This section shall not apply to buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.
3. Open parking garages.

705.8.6 Vertical exposure. For buildings on the same lot, opening protectives having a *fire protection rating* of not less than 3/4 hour shall be provided in every opening that is less than 15 feet (4572 mm) vertically above the roof of an adjacent building or structure based on assuming an imaginary line between them. The opening protectives are required where the *fire separation distances* from the imaginary line to each building or structure are less than 15 feet (4572 mm).

Exceptions:

1. Opening protectives are not required where the roof assembly of the adjacent building or structure has a *fire-resistance rating* of not less than 1 hour for a minimum distance of 10 feet (3048 mm) from the *exterior wall* facing the imaginary line and the entire length and span of the supporting elements for the fire-resistance-rated roof assembly has a *fire-resistance rating* of not less than 1 hour.
2. Buildings on the same lot and considered as portions of one building in accordance with Section 705.3 are not required to comply with Section 705.8.6.

705.9 Joints. Joints made in or between *exterior walls* required by this section to have a *fire-resistance rating* shall comply with Section 715.

Exception: Joints in *exterior walls* that are permitted to have unprotected openings.

705.9.1 Voids. The void created at the intersection of a floor/ceiling assembly and an exterior curtain wall assembly shall be protected in accordance with Section 715.4.

705.10 Ducts and air transfer openings. Penetrations by air ducts and air transfer openings in fire-resistance-rated *exterior walls* required to have protected openings shall comply with Section 717.

Exception: Foundation vents installed in accordance with this code are permitted.

705.11 Parapets. Parapets shall be provided on *exterior walls* of buildings.

Exceptions: A parapet need not be provided on an *exterior wall* where any of the following conditions exist:

1. The wall is not required to be *fire-resistance rated* in accordance with Table 602 because of *fire separation distance*.
2. The building has an area of not more than 1,000 square feet (93 m^2) on any floor.
3. Walls that terminate at roofs of not less than 2-hour fire-resistance-rated construction or where the roof, including the deck or slab and supporting construction, is constructed entirely of noncombustible materials.
4. One-hour fire-resistance-rated *exterior walls* that terminate at the underside of the roof sheathing, deck or slab, provided that:
   - 4.1. Where the roof/ceiling framing elements are parallel to the walls, such framing and elements supporting such framing shall not be of less than 1-hour fire-resistance-rated construction for a width of 4 feet (1220 mm) for Groups R and U and 10 feet (3048 mm) for other occupancies, measured from the interior side of the wall.
   - 4.2. Where roof/ceiling framing elements are not parallel to the wall, the entire span of such framing and elements supporting such framing shall not be of less than 1-hour fire-resistance-rated construction.
   - 4.3. Openings in the roof shall not be located within 5 feet (1524 mm) of the 1-hour fire-resistance-rated *exterior wall* for Groups R and U and 10 feet (3048 mm) for other occupancies, measured from the interior side of the wall.
   - 4.4. The entire building shall be provided with not less than a Class B roof covering.
5. In Groups R-2 and R-3 where the entire building is provided with a Class C roof covering, the *exterior wall* shall be permitted to terminate at the underside of the roof sheathing or deck in Types III, IV and V construction, provided that one or both of the following criteria is met:
   - 5.1. The roof sheathing or deck is constructed of *approved* noncombustible materials or of *fire-retardant-treated wood* for a distance of 4 feet (1220 mm).
   - 5.2. The roof is protected with 0.625-inch (16 mm) Type X gypsum board directly beneath the underside of the roof sheathing or deck, supported by not less than nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members for a minimum distance of 4 feet (1220 mm).
6. Where the wall is permitted to have not less than 25 percent of the *exterior wall* areas containing unprotected openings based on *fire separation distance* as determined in accordance with Section 705.8.

705.11.1 Parapet construction. Parapets shall have the same *fire-resistance rating* as that required for the supporting wall, and on any side adjacent to a roof surface, shall have noncombustible faces for the uppermost 18 inches (457 mm), including counterflashing and coping materials. The height of the parapet shall be not less than 30 inches (762 mm) above the point where the roof surface and the wall intersect. Where the roof slopes toward a parapet at a slope greater than two units vertical in 12 units horizontal (16.7-percent slope), the parapet shall extend to the same height as any portion of the roof within a *fire separation distance* where protection of wall openings is required, but the height shall be not less than 30 inches (762 mm).

SECTION 706
FIRE WALLS

706.1 General. *Fire walls* shall be constructed in accordance with Sections 706.2 through 706.11. The extent and location of such *fire walls* shall provide a complete separation. Where a *fire wall* separates occupancies that are required to be separated by a *fire barrier* wall, the most restrictive requirements of each separation shall apply.

706.1.1 Party walls. Any wall located on a *lot line* between adjacent buildings, which is used or adapted for joint service between the two buildings, shall be constructed as a *fire wall* in accordance with Section 706. Party walls shall be constructed without openings and shall create separate buildings.

Exceptions:

1. Openings in a party wall separating an *anchor building* and a mall shall be in accordance with Section 402.4.2.2.1.
2. *Fire walls* are not required on lot lines dividing a building for ownership purposes where the aggregate height and area of the portions of the building located on both sides of the lot line do not exceed the maximum height and area requirements of this code. For the code official's review and approval, he or she shall be provided with copies of dedicated access easements and contractual agreements that permit the owners of portions of the building located on either side of the lot line access to the other side for purposes of maintaining fire and life safety systems necessary for the operation of the building.

[S] ((~~706.2 Structural stability.~~ ~~*Fire walls* shall be designed and constructed to allow collapse of the structure on either side without collapse of the wall under fire conditions. *Fire walls* designed and constructed in accordance with NFPA 221 shall be deemed to comply with this section.~~

~~**Exception:** In Seismic Design Categories D through F, where double *fire walls* are used in accordance with NFPA 221, floor and roof sheathing not exceeding 3/4 inch (19.05 mm) thickness shall be permitted to be continuous through the wall assemblies of light frame construction.~~))

[S] 706.3 Materials. *Fire walls* that separate a building of Type I or II construction from a building of any construction type shall be of any *approved* noncombustible materials. Other *fire walls* shall be built of materials consistent with the types permitted for the type of construction of the building.

((~~**Exception:** Buildings of Type V construction.~~))

706.4 Fire-resistance rating. *Fire walls* shall have a *fire-resistance rating* of not less than that required by Table 706.4.

TABLE 706.4
FIRE WALL FIRE-RESISTANCE RATINGS

GROUP	FIRE-RESISTANCE RATING (hours)
A, B, E, H-4, I, R-1, R-2, U	3[a]
F-1, H-3[b], H-5, M, S-1	3
H-1, H-2	4[b]
F-2, S-2, R-3 ((~~, R-4~~))	2

a. In Type II, III or V construction, walls shall be permitted to have a 2-hour fire-resistance rating.
b. For Group H-1, H-2 or H-3 buildings, also see Sections 415.7 and 415.8.

706.5 Horizontal continuity. *Fire walls* shall be continuous from *exterior wall* to *exterior wall* and shall extend not less than 18 inches (457 mm) beyond the exterior surface of *exterior walls*.

Exceptions:

1. *Fire walls* shall be permitted to terminate at the interior surface of combustible exterior sheathing or siding provided that the *exterior wall* has a *fire-resistance rating* of not less than 1 hour for a horizontal distance of not less than 4 feet (1220 mm) on both sides of the *fire wall*. Openings within such *exterior walls* shall be protected by opening protectives having a *fire protection rating* of not less than 3/4 hour.
2. *Fire walls* shall be permitted to terminate at the interior surface of noncombustible exterior sheathing, exterior siding or other noncombustible exterior finishes provided that the sheathing, siding or other exterior noncombustible finish extends a horizontal distance of not less than 4 feet (1220 mm) on both sides of the *fire wall*.
3. *Fire walls* shall be permitted to terminate at the interior surface of noncombustible exterior sheathing where the building on each side of the *fire wall* is protected by an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2.

706.5.1 Exterior walls. Where the *fire wall* intersects *exterior walls*, the *fire-resistance rating* and opening protection of the *exterior walls* shall comply with one of the following:

1. The *exterior walls* on both sides of the *fire wall* shall have a 1-hour *fire-resistance rating* with 3/4-hour protection where opening protection is required by Section 705.8. The *fire-resistance rating* of the *exterior wall* shall extend not less than 4 feet (1220 mm) on each side of the intersection of the *fire wall* to *exterior wall*. *Exterior wall* intersections at *fire walls* that form an angle equal to or greater than 180 degrees (3.14 rad) do not need *exterior wall* protection.
2. Buildings or spaces on both sides of the intersecting *fire wall* shall assume to have an imaginary *lot line* at the *fire wall* and extending beyond the exterior of the *fire wall*. The location of the assumed line in relation to the *exterior walls* and the *fire wall* shall be such that the *exterior wall* and opening protection meet the requirements set forth in Sections 705.5 and 705.8. Such protection is not required for *exterior walls* terminating at *fire walls* that form an angle equal to or greater than 180 degrees (3.14 rad).

706.5.2 Horizontal projecting elements. *Fire walls* shall extend to the outer edge of horizontal projecting elements such as balconies, roof overhangs, canopies, marquees and similar projections that are within 4 feet (1220 mm) of the *fire wall*.

Exceptions:

1. Horizontal projecting elements without concealed spaces, provided that the *exterior wall* behind and below the projecting element has not less than 1-hour fire-resistance-rated construction for a distance not less than the depth of the projecting element on both sides of the *fire wall*. Openings within such *exterior walls* shall be protected by opening protectives having a *fire protection rating* of not less than 3/4 hour.
2. Noncombustible horizontal projecting elements with concealed spaces, provided that a minimum 1-hour fire-resistance-rated wall extends through the concealed space. The projecting element shall be separated from the building by not less than 1-hour fire-resistance-rated construction for a distance on each side of the *fire wall* equal to the

depth of the projecting element. The wall is not required to extend under the projecting element where the building *exterior wall* is not less than 1-hour *fire-resistance rated* for a distance on each side of the *fire wall* equal to the depth of the projecting element. Openings within such *exterior walls* shall be protected by opening protectives having a *fire protection rating* of not less than 3/4 hour.

3. For combustible horizontal projecting elements with concealed spaces, the *fire wall* need only extend through the concealed space to the outer edges of the projecting elements. The *exterior wall* behind and below the projecting element shall be of not less than 1-hour fire-resistance-rated construction for a distance not less than the depth of the projecting elements on both sides of the *fire wall*. Openings within such *exterior walls* shall be protected by opening protectives having a *fire protection rating* of not less than 3/4 hour.

[W][S] 706.6 Vertical continuity. *Fire walls* shall extend from the foundation to a termination point not less than 30 inches (762 mm) above both adjacent roofs.

Exceptions:

1. Stepped buildings in accordance with Section 706.6.1.
2. Two-hour fire-resistance-rated walls shall be permitted to terminate at the underside of the roof sheathing, deck or slab, provided that:
   - 2.1. The ((~~lower~~)) roof assembly within 4 feet (1220 mm) of the wall has not less than a 1-hour *fire-resistance rating* and the entire length and span of supporting elements for the rated roof assembly has a *fire-resistance rating* of not less than 1 hour.
   - 2.2. Openings in the roof shall not be located within 4 feet (1220 mm) of the *fire wall*.
   - 2.3. Each building shall be provided with not less than a Class B roof covering.
3. Walls shall be permitted to terminate at the underside of noncombustible roof sheathing, deck or slabs where both buildings are provided with not less than a Class B roof covering. Openings in the roof shall not be located within 4 feet (1220 mm) of the *fire wall*.
4. In buildings of Types III, IV and V construction, walls shall be permitted to terminate at the underside of combustible roof sheathing or decks, provided that all of the following requirements are met:
   - 4.1. Roof openings are not less than 4 feet (1220 mm) from the *fire wall*.
   - 4.2. The roof is covered with a minimum Class B roof covering.
   - 4.3. The roof sheathing or deck is constructed of *fire-retardant-treated wood* for a distance of 4 feet (1220 mm) on both sides of the wall or the roof is protected with 5/8-inch (15.9 mm) Type X gypsum board directly beneath the underside of the roof sheathing or deck, supported by not less than 2-inch (51 mm) nominal ledgers attached to the sides of the roof framing members for a distance of not less than 4 feet (1220 mm) on both sides of the *fire wall*.
5. In buildings designed in accordance with Section 510.2, *fire walls* located above the 3-hour *horizontal assembly* required by Section 510.2, Item 1 shall be permitted to extend from the top of this *horizontal assembly*.
6. Buildings with sloped roofs in accordance with Section 706.6.2.

706.6.1 Stepped buildings. Where a *fire wall* serves as an *exterior wall* for a building and separates buildings having different roof levels, such wall shall terminate at a point not less than 30 inches (762 mm) above the lower roof level. ((~~, provided the *exterior wall* for a height of 15 feet (4572 mm)~~)) Exterior walls above the ((~~lower roof is~~)) fire wall extending more than 30 inches above the lower roof shall be of not less than 1-hour fire-resistance-rated construction from both sides with openings protected by fire assemblies having a *fire protection rating* of not less than 3/4 hour. Portions of the exterior walls exceeding 15 feet above the lower roof shall be permitted to be of *non-fire-resistance-rated* construction unless otherwise required by other provisions of this code.

Exception: ((~~Where the~~)) A *fire wall* ((~~terminates~~)) serving as part of an exterior wall for a building that separates buildings having different roof levels shall be permitted to terminate at the underside of the roof sheathing, deck or slab of the lower roof, provided ((~~that:~~)) items 1, 2 and 3 below are met. The exterior wall above the fire wall is not required to be of fire-resistance rated construction, unless required by other provisions of this code.

1. The lower roof assembly within 10 feet (3048 mm) of the wall has not less than a 1-hour *fire-resistance rating*. ((~~and the~~))
2. The entire length and span of supporting elements for the rated roof assembly ((~~has~~)) shall have a *fire-resistance rating* of not less than 1 hour.

((~~2~~)) 3. Openings in the lower roof ((~~shall not be~~)) are not located within 10 feet (3048 mm) of the *fire wall*.

706.6.2 Buildings with sloped roofs. Where a *fire wall* also serves as an interior wall for a building, and the roof on one side or both sides of the *fire wall* slopes toward the *fire wall* at a slope greater than two units vertical in 12 units horizontal (2:12),

the *fire wall* shall extend to a height equal to the height of the roof located 4 feet (1219 mm) from the *fire wall* plus 30 inches (762 mm). The extension of the *fire wall* shall be not less than 30 inches (762 mm).

Exceptions:

1. Two-hour fire-resistance-rated walls shall be permitted to terminate at the underside of the roof sheathing, deck or slab, provided:
   - 1.1. The *roof assembly* within 4 feet (1220 mm) of the wall has not less than a 1-hour *fire-resistance rating* and the entire length and span of supporting elements for the rated *roof assembly* has a *fire-resistance rating* of not less than 1 hour.
   - 1.2. Openings in the roof shall not be located within 4 feet (1220 mm) of the *fire wall.*
   - 1.3. Each *building* shall be provided with not less than a Class B roof covering.
2. Walls shall be permitted to terminate at the underside of noncombustible roof sheathing, deck or slabs where both *buildings* are provided with not less than a Class B roof covering. Openings in the roof shall not be located within 4 feet (1220 mm) of the *fire wall.*
3. In buildings of Type III, IV and V construction, walls shall be permitted to terminate at the underside of combustible roof sheathing or decks, provided:
   - 3.1. There are no openings in the roof within 4 feet (1220 mm) of the *fire wall*,
   - 3.2. The roof is covered with a minimum Class B roof covering, and
   - 3.3. The roof sheathing or deck is constructed of *fire-retardant-treated wood* for a distance of 4 feet (1220 mm) on both sides of the wall or the roof is protected with 5/8-inch (15.9 mm) Type X gypsum board directly beneath the underside of the roof sheathing or deck, supported by a minimum of 2-inch (51 mm) nominal ledgers attached to the sides of the roof framing members for a minimum distance of 4 feet (1220 mm) on both sides of the *fire wall.*

706.7 Combustible framing in fire walls. Adjacent combustible members entering into a concrete or masonry *fire wall* from opposite sides shall not have less than a 4-inch (102 mm) distance between embedded ends. Where combustible members frame into hollow walls or walls of hollow units, hollow spaces shall be solidly filled for the full thickness of the wall and for a distance not less than 4 inches (102 mm) above, below and between the structural members, with noncombustible materials *approved* for *fireblocking.*

706.8 Openings. Each opening through a *fire wall* shall be protected in accordance with Section 716 and shall not exceed 156 square feet (15 m^2). The aggregate width of openings at any floor level shall not exceed 25 percent of the length of the wall.

Exceptions:

1. Openings are not permitted in party walls constructed in accordance with Section 706.1.1.
2. Openings shall not be limited to 156 square feet (15 m^2) where both buildings are equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1.

706.9 Penetrations. Penetrations of *fire walls* shall comply with Section 714.

706.10 Joints. Joints made in or between *fire walls* shall comply with Section 715.

706.11 Ducts and air transfer openings. Ducts and air transfer openings shall not penetrate *fire walls.*

Exception: Penetrations by ducts and air transfer openings of *fire walls* that are not on a *lot line* shall be allowed provided that the penetrations comply with Section 717. The size and aggregate width of all openings shall not exceed the limitations of Section 706.8.

SECTION 707
FIRE BARRIERS

707.1 General. *Fire barriers* installed as required elsewhere in this code or the *International Fire Code* shall comply with this section.

707.2 Materials. *Fire barriers* shall be of materials permitted by the building type of construction.

707.3 Fire-resistance rating. The *fire-resistance rating* of *fire barriers* shall comply with this section.

707.3.1 Shaft enclosures. The *fire-resistance rating* of the *fire barrier* separating building areas from a shaft shall comply with Section 713.4.

707.3.2 Interior exit stairway and ramp construction. The *fire-resistance rating* of the *fire barrier* separating building areas from an *interior exit stairway* or *ramp* shall comply with Section 1023.1.

707.3.3 Enclosures for exit access stairways. The *fire-resistance rating* of the *fire barrier* separating building areas from an *exit access stairway* or *ramp* shall comply with Section 713.4.

707.3.4 Exit passageway. The *fire-resistance rating* of the *fire barrier* separating building areas from an *exit* passageway shall comply with Section 1024.3.

707.3.5 Horizontal exit. The *fire-resistance rating* of the separation between building areas connected by a horizontal *exit* shall comply with Section 1026.1.

707.3.6 Atriums. The *fire-resistance rating* of the *fire barrier* separating atriums shall comply with Section 404.6.

707.3.7 Incidental uses. The *fire barrier* separating incidental uses from other spaces in the building shall have a *fire-resistance rating* of not less than that indicated in Table 509.

707.3.8 Control areas. *Fire barriers* separating *control areas* shall have a *fire-resistance rating* of not less than that required in Section 414.2.4.

707.3.9 Separated occupancies. Where the provisions of Section 508.4 are applicable, the *fire barrier* separating mixed occupancies shall have a *fire-resistance rating* of not less than that indicated in Table 508.4 based on the occupancies being separated.

707.3.10 Fire areas. The *fire barriers*, *fire walls* or *horizontal assemblies*, or combination thereof, separating a single occupancy into different *fire areas* shall have a *fire-resistance rating* of not less than that indicated in Table 707.3.10. The *fire barriers*, *fire walls* or *horizontal assemblies*, or combination thereof, separating *fire areas* of mixed occupancies shall have a *fire-resistance rating* of not less than the highest value indicated in Table 707.3.10 for the occupancies under consideration.

TABLE 707.3.10
FIRE-RESISTANCE RATING REQUIREMENTS FOR FIRE BARRIERS, FIRE WALLS OR HORIZONTAL ASSEMBLIES BETWEEN FIRE AREAS

OCCUPANCY GROUP	FIRE-RESISTANCE RATING (hours)
H-1, H-2	4
F-1, H-3, S-1	3
A, B, E, F-2, H-4, H-5, I, M, R, S-2	2
U	1

[W] 707.4 Exterior walls. Where exterior walls serve as a part of a required fire-resistance-rated shaft or ((~~stairway~~)) separation or ((~~ramp~~)) enclosure for a stairway, ramp or ((~~separation~~)) exit passageway, such walls shall comply with the requirements of Section 705 for exterior walls and the fire-resistance-rated enclosure or separation requirements shall not apply.

Exception: Exterior walls required to be *fire-resistance rated* in accordance with Section 1021 for exterior egress balconies, Section 1023.7 for interior exit stairways and ramps, Section 1024.8 for exit passageways and Section 1027.6 for exterior exit stairways and ramp.

[W] 707.5 Continuity. *Fire barriers* shall extend from the top of the foundation or floor/ceiling assembly below to the underside of the floor or roof sheathing, slab or deck above and shall be securely attached thereto. Such *fire barriers* shall be continuous through concealed space, such as the space above a suspended ceiling. Joints and voids at intersections shall comply with Sections 707.8 and 707.9

Exceptions:

1. Shaft enclosures shall be permitted to terminate at a top enclosure complying with Section 713.12.
2. *Interior exit stairway* and *ramp* enclosures required by Section 1023 and *exit access stairway* and *ramp* enclosures required by Section 1019 shall be permitted to terminate at a top enclosure complying with Section 713.12.
3. An exit passageway enclosure required by Section 1024.3 that does not extend to the underside of the roof sheathing, slab or deck above shall be enclosed at the top with construction of the same *fire-resistance rating* as required for the exit passageway.

707.5.1 Supporting construction. The supporting construction for a *fire barrier* shall be protected to afford the required *fire-resistance rating* of the *fire barrier* supported. Hollow vertical spaces within a *fire barrier* shall be fireblocked in accordance with Section 718.2 at every floor level.

Exceptions:

1. The maximum required *fire-resistance rating* for assemblies supporting *fire barriers* separating tank storage as provided for in Section 415.9.1.2 shall be 2 hours, but not less than required by Table 601 for the building construction type.

2. Supporting construction for 1-hour *fire barriers* required by Table 509 in buildings of Types IIB, IIIB and VB construction is not required to be *fire-resistance rated* unless required by other sections of this code.

707.6 Openings. Openings in a *fire barrier* shall be protected in accordance with Section 716. Openings shall be limited to a maximum aggregate width of 25 percent of the length of the wall, and the maximum area of any single opening shall not exceed 156 square feet (15 m^2). Openings in enclosures for *exit access stairways* and *ramps*, *interior exit stairways* and *ramps* and *exit passageways* shall also comply with Sections 1019, 1023.4 and 1024.5, respectively.

Exceptions:

1. Openings shall not be limited to 156 square feet (15 m^2) where adjoining floor areas are equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
2. Openings shall not be limited to 156 square feet (15 m^2) or an aggregate width of 25 percent of the length of the wall where the opening protective is a *fire door* serving enclosures for exit access stairways and ramps, and interior exit stairways and ramps.
3. Openings shall not be limited to 156 square feet (15 m^2) or an aggregate width of 25 percent of the length of the wall where the opening protective has been tested in accordance with ASTM E119 or UL 263 and has a minimum *fire-resistance rating* not less than the *fire-resistance rating* of the wall.
4. Fire window assemblies permitted in atrium separation walls shall not be limited to a maximum aggregate width of 25 percent of the length of the wall.
5. Openings shall not be limited to 156 square feet (15 m^2) or an aggregate width of 25 percent of the length of the wall where the opening protective is a *fire door assembly* in a *fire barrier* separating an enclosure for *exit access* stairways and ramps, and interior exit stairways and ramps from an exit passageway in accordance with Section 1023.3.1.

707.7 Penetrations. Penetrations of *fire barriers* shall comply with Section 714.

707.7.1 Prohibited penetrations. Penetrations into enclosures for *exit access stairways* and *ramps*, *interior exit stairways* and *ramps*, and *exit passageways* shall be allowed only where permitted by Sections 1019, 1023.5 and 1024.6, respectively.

707.8 Joints. Joints made in or between *fire barriers*, and joints made at the intersection of *fire barriers* with underside of a fire-resistance-rated floor or roof sheathing, slab or deck above, and the exterior vertical wall intersection shall comply with Section 715.

707.9 Voids at intersections. The voids created at the intersection of a *fire barrier* and a nonfire-resistance-rated roof assembly or a nonfire-resistance-rated exterior wall assembly shall be filled. An approved material or system shall be used to fill the void, and shall be securely installed in or on the intersection for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to retard the passage of fire and hot gases.

707.10 Ducts and air transfer openings. Penetrations in a *fire barrier* by ducts and air transfer openings shall comply with Section 717.

SECTION 708
FIRE PARTITIONS

[S] 708.1 General. The following wall assemblies shall comply with this section.

1. Separation walls as required by Section 420.2 for Group I-1 and Group R occupancies.
2. Walls separating tenant spaces in *covered and open mall buildings* as required by Section 402.4.2.1.
3. Corridor walls as required by Section 1020.1.
4. Enclosed elevator lobby separation as required by Section ((~~3006.2~~)) 713.14.
5. Egress balconies as required by Section 1021.2
6. Elevator machine rooms and elevator control rooms as required by Section 3020.4 and Table 509.

708.2 Materials. The walls shall be of materials permitted by the building type of construction.

708.3 Fire-resistance rating. *Fire partitions* shall have a *fire-resistance rating* of not less than 1 hour.

Exceptions:

1. Corridor walls permitted to have a 1/2-hour *fire-resistance rating* by Table 1020.1.
2. *Dwelling unit* and *sleeping unit* separations in buildings of Types IIB, IIIB and VB construction shall have *fire-resistance ratings* of not less than 1/2 hour in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

[S] 708.4 Continuity. *Fire partitions* shall extend from the top of the foundation or floor/ceiling assembly below and be securely attached to one of the following:

1. The underside of the floor or roof sheathing, deck or slab above.
2. The underside of a floor/ceiling or roof/ceiling assembly having a fire-resistance rating that is not less than the *fire-resistance rating* of the *fire partition*.

Exceptions:

1. *Fire partitions* shall not be required to extend into a crawl space below where the floor above the crawl space has a minimum 1-hour *fire-resistance rating*.
2. *Fire partitions* serving as a corridor wall shall not be required to extend above the lower membrane of a corridor ceiling provided that the corridor ceiling membrane is equivalent to corridor wall membrane, and either of the following conditions is met:
   - 2.1. The room-side membrane of the corridor wall extends to the underside of the floor or roof sheathing, deck or slab of a fire-resistance-rated floor or roof above.
   - 2.2. The building is equipped with an automatic sprinkler system installed throughout in accordance with Section 903.3.1.1 or 903.3.1.2, including automatic sprinklers installed in the space between the top of the *fire partition* and underside of the floor or roof sheathing, deck or slab above.
3. *Fire partitions* serving as a corridor wall shall be permitted to terminate at the upper membrane of the corridor ceiling assembly where the corridor ceiling is constructed as required for the corridor wall.
4. *Fire partitions* separating tenant spaces in a covered or open mall building complying with Section 402.4.2.1 shall not be required to extend above the underside of a ceiling. Such ceiling shall not be required to be part of a fire-resistance-rated assembly, and the attic or space above the ceiling at tenant separation walls shall not be required to be subdivided by *fire partitions*.

708.4.1 Supporting construction. The supporting construction for a *fire partition* shall have a *fire-resistance rating* that is equal to or greater than the required fire-resistance rating of the supported *fire partition*.

Exception: In buildings of Types IIB, IIIB and VB construction, the supporting construction requirement shall not apply to *fire partitions* separating tenant spaces in covered and open mall buildings, *fire partitions* separating dwelling units, *fire partitions* separating sleeping units, ((~~and~~)) *fire partitions* serving as corridor walls and walls enclosing elevator machine rooms and elevator control rooms.

708.4.2 Fireblocks and draftstops in combustible construction. In combustible construction where *fire partitions* do not extend to the underside of the floor or roof sheathing, deck or slab above, the space above and along the line of the *fire partition* shall be provided with one of the following: **

1. *Fireblocking* up to the underside of the floor or roof sheathing, deck or slab above using materials complying with Section 718.2.1.
2. Draftstopping up to the underside of the floor or roof sheathing, deck or slab above using materials complying with Section 718.3.1 for floors or Section 718.4.1 for attics.

Exceptions:

1. Buildings equipped with an automatic sprinkler system installed throughout in accordance with Section 903.3.1.1, or in accordance with Section 903.3.1.2 provided that protection is provided in the space between the top of the *fire partition* and underside of the floor or roof sheathing, deck or slab above as required for systems complying with Section 903.3.1.1.
2. Where corridor walls provide a sleeping unit or dwelling unit separation, draftstopping shall only be required above one of the corridor walls.
3. In Group R-2 occupancies with fewer than four dwelling units, *fireblocking* and draftstopping shall not be required.
4. In Group R-2 occupancies up to and including four stories in height in buildings not exceeding 60 feet (18 288 mm) in height above grade plane, the attic space shall be subdivided by *draftstops* into areas not exceeding 3,000 square feet (279 m^2) or above every two dwelling units, whichever is smaller.
5. In Group R-3 occupancies with fewer than three dwelling units, fire-blocking and draftstopping shall not be required in floor assemblies.

708.5 Exterior walls. Where *exterior walls* serve as a part of a required fire-resistance-rated separation, such walls shall comply with the requirements of Section 705 for *exterior walls*, and the fire-resistance-rated separation requirements shall not apply.

Exception: Exterior walls required to be fire-resistance rated in accordance with Section 1021.2 for exterior egress balconies, Section 1023.7 for interior exit stairways and ramps and Section 1027.6 for exterior exit stairways and ramps.

708.6 Openings. Openings in a *fire partition* shall be protected in accordance with Section 716.

708.7 Penetrations. Penetrations of *fire partitions* shall comply with Section 714.

708.8 Joints. Joints made in or between *fire partitions* shall comply with Section 715.

708.9 Ducts and air transfer openings. Penetrations in a *fire partition* by ducts and air transfer openings shall comply with Section 717.

SECTION 709
SMOKE BARRIERS

709.1 General. Vertical and horizontal *smoke barriers* shall comply with this section.

709.2 Materials. *Smoke barriers* shall be of materials permitted by the building type of construction.

709.3 Fire-resistance rating. A 1-hour *fire-resistance rating* is required for *smoke barriers*.

Exception: *Smoke barriers* constructed of minimum 0.10-inch-thick (2.5 mm) steel in Group I-3 buildings.

[S] 709.4 Continuity. *Smoke barriers* shall form an effective membrane continuous from the top of the foundation or floor/ceiling assembly below to the underside of the floor or roof sheathing, deck or slab above, including continuity through concealed spaces, such as those found above suspended ceilings, and interstitial structural and mechanical spaces. The supporting construction shall be protected to afford the required *fire-resistance rating* of the wall or floor supported in buildings of other than Type IIB, IIIB or VB construction. *Smoke barrier* walls used to separate *smoke compartments* shall comply with Section 709.4.1. *Smoke-barrier* walls used to enclose areas of refuge in accordance with Section 1009.6.4 or to enclose elevator lobbies in accordance with Section 403.6.1.5, 403.6.2.6 or 405.4.3 ((~~, 3007.6.2, or 3008.6.2~~)) shall comply with Section 709.4.2.

Exception: *Smoke-barrier* walls are not required in interstitial spaces where such spaces are designed and constructed with ceilings or *exterior walls* that provide resistance to the passage of fire and smoke equivalent to that provided by the *smoke-barrier* walls.

709.4.1 Smoke-barrier walls separating smoke compartments. *Smoke-barrier* walls used to separate *smoke compartments* shall form an effective membrane continuous from outside wall to outside wall.

[S] 709.4.2 Smoke-barrier walls enclosing areas of refuge or elevator lobbies. *Smoke-barrier* walls used to enclose areas of refuge in accordance with Section 1009.6.4, or to enclose elevator lobbies in accordance with Section 403.6.1.5, 403.6.2.6 or 405.4.3, ((~~3007.6.2, or 3008.6.2,~~)) shall form an effective membrane enclosure that terminates at a *fire barrier* wall having a level of *fire protection rating* not less than 1 hour, another *smoke barrier* wall or an outside wall. A smoke and draft control door assembly as specified in Section 716.2.2.1.1 shall not be required at each elevator hoistway door opening or at each exit doorway between an area of refuge and the exit enclosure.

709.5 Openings. Openings in a *smoke barrier* shall be protected in accordance with Section 716.

Exceptions:

1. In Group I-1, Condition 2, Group I-2 and *ambulatory care facilities*, where a pair of opposite-swinging doors are installed across a corridor in accordance with Section 709.5.1, the doors shall not be required to be protected in accordance with Section 716. The doors shall be close fitting within operational tolerances, and shall not have a center mullion or undercuts in excess of 3/4 inch (19.1 mm), louvers or grilles. The doors shall have head and jamb stops, and astragals or rabbets at meeting edges. Where permitted by the door manufacturer's listing, positive-latching devices are not required. Factory-applied or field-applied protective plates are not required to be labeled.
2. In Group I-1, Condition 2, Group I-2 and *ambulatory care facilities*, special purpose horizontal sliding, accordion or folding doors installed in accordance with Section 1010.1.4.3 and protected in accordance with Section 716.

709.5.1 Group I-2 and ambulatory care facilities. In Group I-2 and ambulatory care facilities, where doors protecting openings in *smoke barriers* are installed across a corridor and have hold-open devices, the doors shall be automatic-closing in accordance with Section 716.2.6.6. Such doors shall have a vision panel with fire-protection-rated glazing materials in fire-protection-rated frames, the area of which shall not exceed that tested.

709.6 Penetrations. Penetrations of *smoke barriers* shall comply with Section 714.

709.7 Joints. Joints made in or between *smoke barriers* shall comply with Section 715.

709.8 Ducts and air transfer openings. Penetrations in a *smoke barrier* by ducts and air transfer openings shall comply with Section 717.

711.2.4.1 Separating mixed occupancies. Where the *horizontal assembly* separates mixed occupancies, the assembly shall have a *fire-resistance rating* of not less than that required by Section 508.4 based on the occupancies being separated.

711.2.4.2 Separating fire areas. Where the *horizontal assembly* separates a single occupancy into different fire areas, the assembly shall have a *fire-resistance rating* of not less than that required by Section 707.3.10.

711.2.4.3 Dwelling units and sleeping units. *Horizontal assemblies* serving as dwelling or sleeping unit separations in accordance with Section 420.3 shall be not less than 1-hour *fire-resistance-rated* construction.

Exception: *Horizontal assemblies* separating *dwelling units* and *sleeping units* shall be not less than 1/2-hour fire-resistance-rated construction in a building of Types IIB, IIIB and VB construction, where the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

711.2.4.4 Separating smoke compartments. Where the *horizontal assembly* is required to be a *smoke barrier*, the assembly shall comply with Section 709.

711.2.4.5 Separating incidental uses. Where the *horizontal assembly* separates incidental uses from the remainder of the building, the assembly shall have a *fire-resistance rating* of not less than that required by Section 509.

711.2.4.6 Other separations. Where a *horizontal assembly* is required by other sections of this code, the assembly shall have a *fire-resistance rating* of not less than that required by that section.

711.2.5 Ceiling panels. Where the weight of lay-in ceiling panels, used as part of fire-resistance-rated floor/ceiling or roof/ceiling assemblies, is not adequate to resist an upward force of 1 pound per square foot (48 Pa), wire or other *approved* devices shall be installed above the panels to prevent vertical displacement under such upward force.

711.2.6 Unusable space. In 1-hour fire-resistance-rated floor/ceiling assemblies, the ceiling membrane is not required to be installed over unusable crawl spaces. In 1-hour fire-resistance-rated roof assemblies, the floor membrane is not required to be installed where unusable *attic* space occurs above.

711.3 Nonfire-resistance-rated floor and roof assemblies. Nonfire-resistance-rated floor, floor/ceiling, roof and roof/ceiling assemblies shall comply with Sections 711.3.1 and 711.3.2.

711.3.1 Materials. Assemblies shall be of materials permitted by the building type of construction.

711.3.2 Continuity. Assemblies shall be continuous without vertical openings, except as permitted by Section 712.

SECTION 712
VERTICAL OPENINGS

[S] 712.1 General. Each vertical opening shall comply in accordance with one of the protection methods in Sections 712.1.1 through ((~~712.1.16~~)) 712.1.17.

712.1.1 Shaft enclosures. Vertical openings contained entirely within a shaft enclosure complying with Section 713 shall be permitted. Elevator hoistways shall be protected in accordance with Section 713.14.2.

712.1.2 Individual dwelling unit. Unconcealed vertical openings totally within an individual residential dwelling unit and connecting four stories or less shall be permitted.

712.1.3 Escalator openings. Where a building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, vertical openings for escalators shall be permitted where protected in accordance with Section 712.1.3.1 or 712.1.3.2.

712.1.3.1 Opening size. Protection by a draft curtain and closely spaced sprinklers in accordance with NFPA 13 shall be permitted where the area of the vertical opening between stories does not exceed twice the horizontal projected area of the escalator. In other than Groups B and M, this application is limited to openings that do not connect more than four stories.

Note: NFPA 13 requires draft curtains to be at least 18 inches (457 mm) deep, and to be of noncombustible or limited-combustible material.

712.1.3.2 Automatic shutters. Protection of the vertical opening by approved shutters at every penetrated floor shall be permitted in accordance with this section. The shutters shall be of noncombustible construction and have a *fire-resistance rating* of not less than 1.5 hours. The shutter shall be so constructed as to close immediately upon the actuation of a smoke detector installed in accordance with Section 907.3.1 and shall completely shut off the well opening. Escalators shall cease operation when the shutter begins to close. The shutter shall operate at a speed of not more than 30 feet per minute (152.4 mm/s) and shall be equipped with a sensitive leading edge to arrest its progress where in contact with any obstacle, and to continue its progress on release therefrom.

712.1.4 Penetrations. Penetrations, concealed and unconcealed, shall be permitted where protected in accordance with Section 714.

712.1.5 Joints. Joints shall be permitted where complying with Section 712.1.5.1 or 712.1.5.2, as applicable.

712.1.5.1 Joints in or between horizontal assemblies. Joints made in or between *horizontal assemblies* shall comply with Section 715. The void created at the intersection of a floor/ceiling assembly and an exterior curtain wall assembly shall be permitted where protected in accordance with Section 715.4.

712.1.5.2 Joints in or between nonfire-resistance-rated floor assemblies. Joints in or between floor assemblies without a required *fire-resistance rating* shall be permitted where they comply with one of the following:

1. The joint shall be concealed within the cavity of a wall.
2. The joint shall be located above a ceiling.
3. The joint shall be sealed, treated or covered with an *approved* material or system to resist the free passage of flame and the products of combustion.

Exception: Joints meeting one of the exceptions listed in Section 715.1.

712.1.6 Ducts and air transfer openings. Penetrations by ducts and air transfer openings shall be protected in accordance with Section 717. Grease ducts shall be protected in accordance with the *International Mechanical Code*.

712.1.7 Atriums. In other than Group H occupancies, atriums complying with Section 404 shall be permitted.

712.1.8 Masonry chimney. Approved vertical openings for masonry chimneys shall be permitted where the *annular space* is fireblocked at each floor level in accordance with Section 718.2.5.

712.1.9 Two-story openings. In other than Groups I-2 and I-3, a vertical opening that is not used as one of the applications listed in this section shall be permitted if the opening complies with all of the following items:

1. Does not connect more than two stories.
2. Does not penetrate a horizontal assembly that separates fire areas or *smoke barriers* that separate *smoke compartments*.
3. Is not concealed within the construction of a wall or a floor/ceiling assembly.
4. Is not open to a corridor in Group I and R occupancies.
5. Is not open to a corridor on nonsprinklered floors.
6. Is separated from floor openings and air transfer openings serving other floors by construction conforming to required shaft enclosures.

712.1.10 Parking garages. Vertical openings in parking garages for automobile ramps, elevators and duct systems shall comply with Section 712.1.10.1, 712.1.10.2 or 712.1.10.3, as applicable.

712.1.10.1 Automobile ramps. Vertical openings for automobile ramps in parking garages shall be permitted where constructed in accordance with Sections 406.5 and 406.6.

712.1.10.2 Elevators. ((~~Vertical~~)) Non-fire-resistance rated vertical openings for elevator hoistways in parking garages that serve only the parking garage, and complying with Sections 406.5 and 406.6 ((~~, respectively,~~)) shall be permitted.

Note: When Section 712.1.10.2 is applied, the hoistway will be required to be enclosed, but it is not required to be fire-resistance rated. See Section 3020.1.

712.1.10.3 Duct systems. Vertical openings for mechanical exhaust or supply duct systems in parking garages complying with Sections 406.5 and 406.6 ((~~, respectively,~~)) shall be permitted to be unenclosed where such duct system is contained within and serves only the parking garage.

712.1.11 Mezzanine. Vertical openings between a mezzanine complying with Section 505 and the floor below shall be permitted.

712.1.12 Exit access stairways and ramps. Vertical openings containing *exit access stairways* or *ramps* in accordance with Section 1019 shall be permitted.

712.1.13 Openings. Vertical openings for floor fire doors and access doors shall be permitted where protected by Section 712.1.13.1 or 712.1.13.2.

712.1.13.1 Horizontal fire door assemblies. Horizontal *fire door* assemblies used to protect openings in fire-resistance-rated *horizontal assemblies* shall be tested in accordance with NFPA 288, and shall achieve a *fire-resistance rating* not less than the assembly being penetrated. Horizontal *fire door* assemblies shall be labeled by an *approved agency*. The *label* shall be permanently affixed and shall specify the manufacturer, the test standard and the *fire-resistance rating*.

712.1.13.2 Access doors. Access doors shall be permitted in ceilings of fire-resistance-rated floor/ceiling and roof/ceiling assemblies, provided that such doors are tested in accordance with ASTM E119 or UL 263 as horizontal assemblies and labeled by an approved agency for such purpose.

712.1.14 Group I-3. In Group I-3 occupancies, vertical openings shall be permitted in accordance with Section 408.5.

712.1.15 Skylights. Skylights and other penetrations through a fire-resistance-rated roof deck or slab are permitted to be unprotected, provided that the structural integrity of the fire-resistance-rated roof assembly is maintained. Unprotected skylights shall not be permitted in roof assemblies required to be fire-resistance rated in accordance with Section 705.8.6. The supporting construction shall be protected to afford the required *fire-resistance rating* of the *horizontal assembly* supported.

712.1.16 Gas vents and piping. Vertical openings for penetrations of floors inside a wall cavity by gas vents and piping in buildings of Types III, IV, and V construction shall be permitted.

((~~712.1.16~~)) 712.1.17 Openings otherwise permitted. Vertical openings shall be permitted where allowed by other sections of this code.

SECTION 713
SHAFT ENCLOSURES

713.1 General. The provisions of this section shall apply to shafts required to protect openings and penetrations through floor/ceiling and roof/ceiling assemblies. *Interior exit stairways* and *ramps* shall be enclosed in accordance with Section 1023.

713.2 Construction. Shaft enclosures shall be constructed as *fire barriers* in accordance with Section 707 or horizontal assemblies in accordance with Section 711, or both.

713.3 Materials. The shaft enclosure shall be of materials permitted by the building type of construction.

[S] 713.4 Fire-resistance rating. Shaft enclosures shall have a *fire-resistance rating* of not less than 2 hours where connecting more than four *stories*. ((~~or more, and not less than 1 hour where connecting less than four *stories*.~~)) The number of *stories* connected by the shaft enclosure shall include any basements but not any *mezzanines*. Shaft enclosures shall have a *fire-resistance rating* not less than the floor assembly penetrated, but need not exceed 2 hours. Shaft enclosures shall meet the requirements of Section 703.2.1.

713.5 Continuity. Shaft enclosures shall be constructed as *fire barriers* in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both, and shall have continuity in accordance with Section 707.5 for *fire barriers* or Section 711.2.2 for *horizontal assemblies*, as applicable.

713.6 Exterior walls. Where *exterior walls* serve as a part of a required shaft enclosure, such walls shall comply with the requirements of Section 705 for *exterior walls* and the fire-resistance-rated enclosure requirements shall not apply.

Exception: Exterior walls required to be fire-resistance rated in accordance with Section 1021.2 for exterior egress balconies, Section 1023.7 for interior *exit* stairways and ramps and Section 1027.6 for exterior *exit* stairways and ramps.

713.7 Openings. Openings in a shaft enclosure shall be protected in accordance with Section 716 as required for *fire barriers*. Doors shall be self- or automatic-closing by smoke detection in accordance with Section 716.2.6.6.

713.7.1 Prohibited openings. Openings other than those necessary for the purpose of the shaft shall not be permitted in shaft enclosures.

[S] 713.8 Penetrations. Penetrations in a shaft enclosure shall be protected in accordance with Section 714 as required for *fire barriers*. Structural elements, such as beams or joists, where protected in accordance with Section 714 shall be permitted to penetrate a shaft enclosure. See Section 3022 for installation of pipes and ducts in elevator hoistways.

713.8.1 Prohibited penetrations. Penetrations other than those necessary for the purpose of the shaft shall not be permitted in shaft enclosures.

Exception: *Membrane penetrations* shall be permitted on the outside of shaft enclosures. Such penetrations shall be protected in accordance with Section 714.4.2.

713.9 Joints. Joints in a shaft enclosure shall comply with Section 715.

713.10 Duct and air transfer openings. Penetrations of a shaft enclosure by ducts and air transfer openings shall comply with Section 717.

713.11 Enclosure at the bottom. Shafts that do not extend to the bottom of the building or structure shall comply with one of the following:

1. They shall be enclosed at the lowest level with construction of the same *fire-resistance rating* as the lowest floor through which the shaft passes, but not less than the rating required for the shaft enclosure.
2. They shall terminate in a room having a use related to the purpose of the shaft. The room shall be separated from the remainder of the building by *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. The *fire-resistance rating* and opening protectives shall be not less than the protection required for the shaft enclosure.
3. They shall be protected by *approved fire dampers* installed in accordance with their listing at the lowest floor level within the shaft enclosure.

Exceptions:

1. The fire-resistance-rated room separation is not required, provided that the only openings in or penetrations of the shaft enclosure to the interior of the building occur at the bottom. The bottom of the shaft shall be closed off around the penetrating items with materials permitted by Section 718.3.1 for draftstopping, or the room shall be provided with an *approved automatic sprinkler system*.
2. A shaft enclosure containing a waste or linen chute shall not be used for any other purpose and shall discharge in a room protected in accordance with Section 713.13.4.
3. The fire-resistance-rated room separation and the protection at the bottom of the shaft are not required provided that there are no combustibles in the shaft and there are no openings or other penetrations through the shaft enclosure to the interior of the building.

713.12 Enclosure at top. A shaft enclosure that does not extend to the underside of the roof sheathing, deck or slab of the building shall be enclosed at the top with construction of the same *fire-resistance rating* as the topmost floor penetrated by the shaft, but not less than the *fire-resistance rating* required for the shaft enclosure.

713.13 Waste and linen chutes and incinerator rooms. Waste and linen chutes shall comply with the provisions of NFPA 82, Chapter 6 and shall meet the requirements of Sections 712 and 713.13.1 through 713.13.6. Incinerator rooms shall meet the provisions of Sections 713.13.4 through 713.13.5.

Exception: Chutes serving and contained within a single dwelling unit.

713.13.1 Waste and linen. A shaft enclosure containing a recycling, or waste or linen chute shall not be used for any other purpose and shall be enclosed in accordance with Section 713.4. A shaft enclosure shall be permitted to contain recycling and waste chutes. Openings into the shaft, from access rooms and discharge rooms, shall be protected in accordance with this section and Section 716. Openings into chutes shall not be located in *corridors*. Doors into chutes shall be self-closing. Discharge doors shall be self- or automatic-closing upon the actuation of a smoke detector in accordance with Section 716.2.6.6, except that heat-activated closing devices shall be permitted between the shaft and the discharge room.

713.13.2 Materials. A shaft enclosure containing a waste, recycling, or linen chute shall be constructed of materials as permitted by the building type of construction.

713.13.3 Chute access rooms. Access openings for waste or linen chutes shall be located in rooms or compartments enclosed by not less than 1-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. Openings into the access rooms shall be protected by opening protectives having a *fire protection rating* of not less than 3/4 hour. Doors shall be self- or automatic-closing upon the detection of smoke in accordance with Section 716.2.6.6. The room or compartment shall be configured to allow the access door to the room or compartment to close and latch with the access panel to the refuse or laundry chute in any position.

[W] 713.13.4 Chute discharge room. Waste or linen chutes shall discharge into an enclosed room separated by *fire barriers* with a *fire-resistance rating* not less than the required fire rating of the shaft enclosure and constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. Openings into the discharge room from the remainder of the building shall be protected by opening protectives having a *fire protection rating* equal to the protection required for the shaft enclosure. Through penetrations of piping and conduit not necessary for the purpose of the of the chute discharge room are permitted as long as they are protected per 714 and do not impact the operation of the trash collection system. Doors shall be self- or automatic-closing upon the detection of smoke in accordance with Section 716.2.6.6. Waste chutes shall not terminate in an incinerator room. Waste and linen rooms that are not provided with chutes need only comply with Table 509.

713.13.5 Incinerator room. Incinerator rooms shall comply with Table 509.

713.13.6 Automatic sprinkler system. An *approved automatic sprinkler system* shall be installed in accordance with Section 903.2.11.2.

[S] 713.13.7 Chute venting and roof termination. The full diameter of waste and linen chutes shall extend a minimum of 3 feet (0.92 m) above the building roof and be gravity vented per NFPA 82.

Exceptions:

1. Waste and linen chutes are permitted to be mechanically ventilated by an exhaust fan in lieu of gravity venting. The exhaust fan shall be located outside the building at the top of the chute.
2. Where the trash chute does not extend to the upper floor of the building below the roof the trash chute shall be permitted to gravity vent to a sidewall louver termination. The horizontal extension of the trash chute shall be the full diameter of the chute and shall be enclosed in rated construction equal to the rating of the shaft enclosure. Where the chute is mechanically ventilated per *International Mechanical Code* Section 515 the blast cap shall terminate behind the louver and the exhaust fan and duct connection will be enclosed in the rated shaft.

[S] 713.14 Elevator, dumbwaiter and other hoistways. Elevator, dumbwaiter and other hoistway enclosures shall be constructed in accordance with ((~~Sections 712 and 713, and Chapter 30~~)) this section.

713.14.1 General. Elevator hoistway openings and enclosed elevator lobbies shall be provided in accordance with the following:

1. Where hoistway opening protection is required by Section 713.14.2, such protection shall be in accordance with Section 713.14.3.
2. Where enclosed elevator lobbies are required for underground buildings, such lobbies shall comply with Section 405.4.3.
3. Where an area of refuge is required and an enclosed elevator lobby is provided to serve as an area of refuge, the enclosed elevator lobby shall comply with Section 1009.6.
4. Where fire service access elevators are provided, enclosed elevator lobbies shall comply with Section 403.6.1.5.
5. Where occupant evacuation elevators are provided, enclosed elevator lobbies shall comply with Section 403.6.2.6.

Exception: Elevators in parking garages are permitted to comply with 712.1.9.

713.14.2 Hoistway opening protection required. Elevator hoistway door openings shall be protected in accordance with Section 713.14.3 where an elevator hoistway connects more than three *stories*, is required to be enclosed within a shaft enclosure in accordance with Section 712.1.1, and any of the following conditions apply:

1. The building is not protected throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.
2. The building contains a Group I-1 Condition 2 occupancy.
3. The building contains a Group I-2 occupancy.
4. The building contains a Group I-3 occupancy.
5. The building is a high rise and the elevator hoistway is more than 75 feet (22 860 mm) in height. The height of the hoistway shall be measured from the lowest floor to the highest floor of the floors served by the hoistway.

Exceptions:

1. Protection of elevator hoistway door openings is not required where the elevator serves only open parking garages in accordance with Section 406.5.
2. Protection of elevator hoistway door openings is not required at the level(s) of exit discharge, provided the level(s) of exit discharge is equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.1.
3. Enclosed elevator lobbies and protection of elevator hoistway door openings are not required on levels where the elevator hoistway opens to the exterior.

713.14.2.1 Rated corridors. Where *corridors* are required to be fire resistance rated in accordance with Section 1020.1, elevator hoistway openings shall be protected in accordance with Section 713.14.3.

713.14.3 Hoistway opening protection. Where Section 713.14.2 requires protection of the elevator hoistway door opening, the protection shall be provided by one of the following:

1. An enclosed elevator lobby shall be provided at each floor to separate the elevator hoistway shaft enclosure doors from each floor by fire partitions in accordance with Section 708. In addition, doors protecting openings in the elevator lobby enclosure walls shall comply with Section 716.2.2.1 as required for *corridor* walls and shall be automatic-closing by actuation of a smoke detector in accordance with Section 716.2.6.6. Penetrations of the enclosed elevator lobby by ducts and air transfer openings shall be protected as required for *corridors* in accordance with Section 717.5.4.1.
2. An enclosed elevator lobby shall be provided at each floor to separate the elevator hoistway shaft enclosure doors from each floor by smoke partitions in accordance with Section 710 where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2. In addition, doors protecting openings in the smoke partitions shall comply with Sections 710.5.2.2, 710.5.2.3 and 716.2.6.1. Penetrations of the enclosed elevator lobby by ducts and air transfer openings shall be protected as required for *corridors* in accordance with Section 717.5.4.1.
3. Additional doors shall be provided at each elevator hoistway door opening at the point of access to the elevator car. Such door shall comply with the smoke and draft control door assembly requirements in Section 716.2.2.1.1 when tested in accordance with UL 1784 without an artificial bottom seal. They shall be maintained automatic closing by actuation of a smoke detector in accordance with Section 716.2.6.6. Doors that latch shall be provided with panic hardware, openable from inside the elevator car. The doors shall be readily openable from the car side without a key, tool, or special knowledge or effort.
4. The elevator hoistway shall be pressurized in accordance with Section 909.21.

713.14.4 Means of egress. Elevator lobbies shall be provided with at least one means of egress complying with Chapter 10 and other provisions in this code. Egress through an elevator lobby shall be permitted in accordance with Item 1 of Section 1016.2.

[S] 713.15 Chimneys and fireplaces. *Approved* factory-built chimneys shall be installed within shafts as required by Section 713.

Exception: Factory-built chimneys that are exposed to the exterior in an *approved* manner are not required to be installed in shafts.

Approved chimneys serving multiple *dwelling units* are permitted to be installed within the same shaft, provided *approved* metal draft stops are installed at each floor level. All combustible construction shall be protected as required for *fire-resistance-rated* shaft construction. Interior shaft wall joints shall be fire-taped where required and where space allows, but fire-taping is permitted to be omitted from joints on the final closure wall provided the joints are installed in a tight manner.

The back of listed manufactured fireplace boxes is permitted to replace that portion of the shaft wall where they are located, provided the joint between the box and the adjacent shaft wall is tightly constructed and installed according to manufacturer's specification. Fresh air make-up ducts required by the Energy or Mechanical codes are permitted to penetrate the shaft at the fire box. Fresh air make-up ducts which pass through any portion of the building other than the shaft shall be at least 26 gage metal.

SECTION 714
PENETRATIONS

714.1 Scope. The provisions of this section shall govern the materials and methods of construction used to protect *through penetrations* and *membrane penetrations* of *horizontal assemblies* and fire-resistance-rated wall assemblies.

714.1.1 Ducts and air transfer openings. Penetrations of fire-resistance-rated walls by ducts that are not protected with *dampers* shall comply with Sections 714.3 through 714.4.3. Penetrations of *horizontal assemblies* not protected with a shaft as permitted by Section 717.6, and not required to be protected with *fire dampers* by other sections of this code, shall comply with Sections 714.5 through 714.6.2. Ducts and air transfer openings that are protected with *dampers* shall comply with Section 717.

714.2 Installation. A listed *penetration firestop* system shall be installed in accordance with the manufacturer's installation instructions and the listing criteria.

714.3 Installation details. Where sleeves are used, they shall be securely fastened to the assembly penetrated. The space between the item contained in the sleeve and the sleeve itself and any space between the sleeve and the assembly penetrated shall be protected in accordance with this section. Insulation and coverings on or in the penetrating item shall not penetrate the assembly unless the specific material used has been tested as part of the assembly in accordance with this section.

[S] 714.4 Fire-resistance-rated walls. Penetrations into or through *fire walls*, *fire barriers*, *smoke barrier* walls and *fire partitions* shall comply with Sections 714.4.1 through 714.4.3. Penetrations in *smoke barrier* walls shall also comply with Section 714.5.4.

714.4.1 Through penetrations. *Through penetrations* of fire-resistance-rated walls shall comply with Section 714.4.1.1 or 714.4.1.2.

Exception: Where the penetrating items are steel, ferrous or copper pipes, tubes or conduits, the *annular space* between the penetrating item and the fire-resistance-rated wall is permitted to be protected by either of the following measures:

1. In concrete or masonry walls where the penetrating item is a maximum 6-inch (152 mm) nominal diameter and the area of the opening through the wall does not exceed 144 square inches (0.0929 m^2), concrete, grout or mortar is permitted where installed the full thickness of the wall or the thickness required to maintain the *fire-resistance rating*.
2. The material used to fill the *annular space* shall prevent the passage of flame and hot gases sufficient to ignite cotton waste when subjected to ASTM E119 or UL 263 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the *fire-resistance rating* of the construction penetrated.

714.4.1.1 Fire-resistance-rated assemblies. *Through penetrations* shall be protected using systems installed as tested in the *approved* fire-resistance-rated assembly.

714.4.1.2 Through-penetration firestop system. *Through penetrations* shall be protected by an *approved penetration firestop* system installed as tested in accordance with ASTM E814 or UL 1479, with a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water and shall have an *F rating* of not less than the required *fire-resistance rating* of the wall penetrated.

tance-rated floor assembly, provided that the aggregate area of the openings through the assembly does not exceed 144 square inches (92 900 mm^2) in any 100 square feet (9.3 m^2) of floor area.

2. Penetrations in a single concrete floor by steel, ferrous or copper conduits, pipes, tubes or vents with a maximum 6-inch (152 mm) nominal diameter, provided that the concrete, grout or mortar is installed the full thickness of the floor or the thickness required to maintain the *fire-resistance rating*. The penetrating items shall not be limited to the penetration of a single concrete floor, provided that the area of the opening through each floor does not exceed 144 square inches (92 900 mm^2).
3. Penetrations by *listed* electrical boxes of any material, provided that such boxes have been tested for use in fire-resistance-rated assemblies and installed in accordance with the instructions included in the listing.

714.5.1.1 Fire-resistance-rated assemblies. *Through penetrations* shall be protected using systems installed as tested in the *approved* fire-resistance-rated assembly.

714.5.1.2 Through-penetration firestop system. *Through penetrations* shall be protected by an *approved through-penetration firestop system* installed and tested in accordance with ASTM E814 or UL 1479, with a minimum positive pressure differential of 0.01 inch of water (2.49 Pa). The system shall have an F rating/T rating of not less than 1 hour but not less than the required rating of the floor penetrated.

Exceptions:

1. Floor penetrations contained and located within the cavity of a wall above the floor or below the floor do not require a *T rating*.
2. Floor penetrations by floor drains, tub drains or shower drains contained and located within the concealed space of a *horizontal assembly* do not require a *T rating*.
3. Floor penetrations of maximum 4-inch (102 mm) nominal diameter metal conduit or tubing penetrating directly into metal-enclosed electrical power switchgear do not require a *T rating*.

714.5.2 Membrane penetrations. Penetrations of membranes that are part of a *horizontal assembly* shall comply with Section 714.5.1.1 or 714.5.1.2. Where floor/ceiling assemblies are required to have a *fire-resistance rating*, recessed fixtures shall be installed such that the required *fire resistance* will not be reduced.

Exceptions:

1. *Membrane penetrations* by steel, ferrous or copper conduits, pipes, tubes or vents, or concrete or masonry items where the *annular space* is protected either in accordance with Section 714.5.1 or to prevent the free passage of flame and the products of combustion. The aggregate area of the openings through the membrane shall not exceed 100 square inches (64 500 mm^2) in any 100 square feet (9.3 m^2) of ceiling area in assemblies tested without penetrations.
2. Ceiling *membrane penetrations* of maximum 2-hour *horizontal assemblies* by steel electrical boxes that do not exceed 16 square inches (10 323 mm^2) in area, provided that the aggregate area of such penetrations does not exceed 100 square inches (44 500 mm^2) in any 100 square feet (9.29 m^2) of ceiling area, and the *annular space* between the ceiling membrane and the box does not exceed 1/8 inch (3.2 mm).
3. *Membrane penetrations* by electrical boxes of any size or type, that have been *listed* as part of an opening protective material system for use in *horizontal assemblies* and are installed in accordance with the instructions included in the listing.
4. *Membrane penetrations* by *listed* electrical boxes of any material, provided that such boxes have been tested for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing. The *annular space* between the ceiling membrane and the box shall not exceed 1/8 inch (3.2 mm) unless *listed* otherwise.
5. The *annular space* created by the penetration of a fire sprinkler, provided that it is covered by a metal escutcheon plate.
6. Noncombustible items that are cast into concrete building elements and that do not penetrate both top and bottom surfaces of the element.
7. The ceiling membrane of 1- and 2-hour fire-resistance-rated *horizontal assemblies* is permitted to be interrupted with the double wood top plate of a wall assembly that is sheathed with Type X gypsum wallboard, provided that all penetrating items through the double top plates are protected in accordance with Section 714.5.1.1 or 714.5.1.2 and the ceiling membrane is tight to the top plates.
8. Ceiling membrane penetrations by listed luminaires (light fixtures) or by luminaires protected with listed materials, which have been tested for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing.

9. Ventilation openings are permitted in the enclosed underside of combustible balconies and decks provided the closest edge of the vent opening is not more than 12 inches from the outer edge of the balcony or deck. Such vents must be covered with non-combustible corrosion resistant metal mesh. Solid blocking shall be installed between projecting framing members at the exterior building wall.

714.5.3 Dissimilar materials. Noncombustible penetrating items shall not connect to combustible materials beyond the point of firestopping unless it can be demonstrated that the *fire-resistance* integrity of the *horizontal assembly* is maintained.

714.5.4 Penetrations in smoke barriers. Penetrations in *smoke barriers* shall be protected by an approved *through-penetration firestop system* installed and tested in accordance with the requirements of UL 1479 for air leakage. The *L rating* of the system measured at 0.30 inch (7.47 Pa) of water in both the ambient temperature and elevated temperature tests shall not exceed either of the following:

1. 5.0 cfm per square foot (0.025 $m^3/s \cdot m^2$) of penetration opening for each *through-penetration firestop system*.
2. A total cumulative leakage of 50 cfm (0.024 m^3/s) for any 100 square feet (9.3 m^2) of wall area, or floor area.

714.6 Nonfire-resistance-rated assemblies. Penetrations of nonfire-resistance-rated floor or floor/ceiling assemblies or the ceiling membrane of a nonfire-resistance-rated roof/ceiling assembly shall meet the requirements of Section 713 or shall comply with Section 714.6.1 or 714.6.2.

714.6.1 Noncombustible penetrating items. Noncombustible penetrating items that connect not more than five *stories* are permitted, provided that the *annular space* is filled to resist the free passage of flame and the products of combustion with an *approved* noncombustible material or with a fill, void or cavity material that is tested and classified for use in *through-penetration firestop systems*.

714.6.2 Penetrating items. Penetrating items that connect not more than two *stories* are permitted, provided that the *annular space* is filled with an *approved* material to resist the free passage of flame and the products of combustion.

SECTION 715
FIRE-RESISTANT JOINT SYSTEMS

715.1 General. Joints installed in or between fire-resistance-rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies shall be protected by an approved *fire-resistant joint system* designed to resist the passage of fire for a time period not less than the required *fire-resistance rating* of the wall, floor or roof in or between which the system is installed. *Fire-resistant joint systems* shall be tested in accordance with Section 715.3.

Exception: *Fire-resistant joint systems* shall not be required for joints in all of the following locations:

1. Floors within a single *dwelling unit*.
2. Floors where the joint is protected by a shaft enclosure in accordance with Section 713.
3. Floors within atriums where the space adjacent to the atrium is included in the volume of the atrium for smoke control purposes.
4. Floors within malls.
5. Floors and ramps within parking garages or structures constructed in accordance with Sections 406.5 and 406.6.
6. Mezzanine floors.
7. Walls that are permitted to have unprotected openings.
8. Roofs where openings are permitted.
9. Control joints not exceeding a maximum width of 0.625 inch (15.9 mm) and tested in accordance with ASTM E119 or UL 263.
10. The intersection of exterior curtain wall assemblies and the roof slab or roof deck.

715.1.1 Curtain wall assembly. The void created at the intersection of a floor/ceiling assembly and an exterior curtain wall assembly shall be protected in accordance with Section 715.4.

715.2 Installation. A *fire-resistant joint system* shall be securely installed in accordance with the manufacturer's installation instructions and the listing criteria in or on the joint for its entire length so as not to impair its ability to accommodate expected building movements and to resist the passage of fire and hot gases.

715.3 Fire test criteria. *Fire-resistant joint systems* shall be tested in accordance with the requirements of either ASTM E1966 or UL 2079. Nonsymmetrical wall joint systems shall be tested with both faces exposed to the furnace, and the assigned *fire-resistance rating* shall be the shortest duration obtained from the two tests. Where evidence is furnished to show that the wall was tested with the least fire-resistant side exposed to the furnace, subject to acceptance of the *building official*, the wall need not be subjected to tests from the opposite side.

TABLE 716.1(2)—continued
OPENING FIRE PROTECTION ASSEMBLIES, RATINGS AND MARKINGS

TYPE OF ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING (hours)	DOOR VISION PANEL SIZE[b]	FIRE-RATED GLAZING MARKING DOOR VISION PANEL[c, e]	MINIMUM SIDELIGHT/ TRANSOM ASSEMBLY RATING (hours)		FIRE-RATED GLAZING MARKING SIDELIGHT/TRANSOM PANEL	
					Fire protection	Fire resistance	Fire protection	Fire resistance
Exterior walls	3	1-1/2	100 sq. in.[b]	≤ 100 sq. in. = D-H-90 > 100 sq. in = D-H-W-90	Not Permitted	3	Not Permitted	W-180
	2	1-1/2	Maximum size tested	D-H 90 or D-H-W-90	1-1/2	2	D-H-OH-90	W-120
					Fire protection			
	1	3/4	Maximum size tested	D-H-45	3/4		D-H-45	
Smoke barriers					Fire protection			
	1	1/3	Maximum size tested	D-20	3/4		D-H-OH-45	

For SI: 1 square inch = 645.2 mm.

a. Two doors, each with a fire protection rating of 1-1/2 hours, installed on opposite sides of the same opening in a fire wall, shall be deemed equivalent in fire protection rating to one 3-hour fire door.

b. Fire-resistance-rated glazing tested to ASTM E119 in accordance with Section 716.1.2.3 shall be permitted, in the maximum size tested.

c. Under the column heading "Fire-rated glazing marking door vision panel," W refers to the fire-resistance rating of the glazing, not the frame.

d. See Section 716.2.5.1.2.1.

e. See Section 716.1.2.2.1 and Table 716.1(1) for additional permitted markings.

TABLE 716.1(3)
FIRE WINDOW ASSEMBLY FIRE PROTECTION RATINGS

TYPE OF WALL ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE WINDOW ASSEMBLY RATING (hours)	FIRE-RATED GLAZING MARKING
Interior walls			
Fire walls	All	NP[a]	W-XXX[b]
Fire barriers	>1	NP[a]	W-XXX[b]
	1	NP[a]	W-XXX[b]
Atrium separations (Section 707.3.6), Incidental use areas (Section 707.3.7), Mixed occupancy separations (Section 707.3.9)	1	3/4	OH-45 or W-60
Fire partitions	1	3/4	OH-45 or W-60
	0.5	1/3	OH-20 or W-30
Smoke barriers	1	3/4	OH-45 or W-60
Exterior walls	>1	1-1/2	OH-90 or W-XXX[b]
	1	3/4	OH-45 or W-60
	0.5	1/3	OH-20 or W-30
Party wall	All	NP	Not Applicable

NP = Not Permitted.

a. Not permitted except fire-resistance-rated glazing assemblies tested to ASTM E119 or UL 263, as specified in Section 716.1.2.3.

b. XXX = The fire rating duration period in minutes, which shall be equal to the fire-resistance rating required for the wall assembly.

[S] 716.1.1 Alternative methods for determining fire protection ratings. The application of any of the alternative methods *listed* in this section shall be based on the fire exposure and acceptance criteria specified in NFPA 252, NFPA 257, UL 9, UL 10B or UL 10C. The required *fire resistance* of an opening protective shall be permitted to be established by any of the following methods or procedures:

1. Designs documented in *approved* sources.
2. Calculations performed in an *approved* manner.

3. Engineering analysis based on a comparison of opening protective designs having *fire protection ratings* as determined by the test procedures set forth in NFPA 252, NFPA 257, UL 9, UL 10B or UL 10C.
4. Alternative protection methods as allowed by Section ((~~104.11~~)) 104.5.

716.1.2 Glazing. Glazing used in *fire door assemblies* and fire window assemblies shall comply with this section in addition to the requirements of Sections 716.2 and 716.3, respectively.

716.1.2.1 Safety glazing. *Fire-protection-rated* glazing and fire-resistance-rated glazing installed in *fire door* assemblies and fire window assemblies shall comply with the safety glazing requirements of Chapter 24 where applicable.

716.1.2.2 Marking fire-rated glazing assemblies. *Fire-rated glazing* assemblies shall be marked in accordance with Tables 716.1(1), 716.1(2) and 716.1(3).

716.1.2.2.1 Fire-rated glazing identification. For *fire-rated glazing*, the *label* shall bear the identification required in Tables 716.1(1) and 716.1(2). "D" indicates that the glazing is permitted to be used in *fire door* assemblies and meets the fire protection requirements of NFPA 252, UL 10B or UL 10C. "H" indicates that the glazing meets the hose stream requirements of NFPA 252, UL 10B or UL 10C. "T" indicates that the glazing meets the temperature requirements of Section 716.2.2.3.1. The placeholder "XXX" represents the fire-rating period, in minutes.

716.1.2.2.2 Fire-protection-rated glazing identification. For *fire-protection-rated* glazing, the *label* shall bear the following identification required in Tables 716.1(1) and 716.1(3): "OH – XXX." "OH" indicates that the glazing meets both the fire protection and the hose-stream requirements of NFPA 257 or UL 9 and is permitted to be used in fire window openings. The placeholder "XXX" represents the fire-rating period, in minutes.

716.1.2.2.3 Fire-resistance-rated glazing identification. For fire-resistance-rated glazing, the label shall bear the identification required in Section 703.6 and Table 716.1.(1).

716.1.2.2.4 Fire-rated glazing that exceeds the code requirements. *Fire-rated glazing* assemblies marked as complying with hose stream requirements (H) shall be permitted in applications that do not require compliance with hose stream requirements. *Fire-rated glazing* assemblies marked as complying with temperature rise requirements (T) shall be permitted in applications that do not require compliance with temperature rise requirements. *Fire-rated glazing* assemblies marked with ratings (XXX) that exceed the ratings required by this code shall be permitted.

716.1.2.3 Fire-resistance-rated glazing. Fire-resistance-rated glazing tested as part of a fire-resistance-rated wall or floor/ceiling assembly in accordance with ASTM E119 or UL 263 and labeled in accordance with Section 703.6 shall not otherwise be required to comply with this section where used as part of a wall or floor/ceiling assembly.

716.1.2.3.1 Glazing in fire door and fire window assemblies. Fire-resistance-rated glazing shall be permitted in fire door and fire window assemblies where tested and installed in accordance with their listings and where in compliance with the requirements of this section.

[S] 716.2 Fire door assemblies. *Fire door assemblies* required by other sections of this code shall comply with the provisions of this section. *Fire door* frames with transom lights, sidelights or both shall be permitted in accordance with Section 716.2.5.4.

716.2.1 Testing requirements. Approved *fire door* and fire shutter assemblies shall be constructed of any material or assembly of component materials that conforms to the test requirements of Sections 716.2.1.1 through 716.2.1.4 and the *fire protection rating* indicated in Table 716.1(2).

Exceptions:

1. Labeled protective assemblies that conform to the requirements of this section or UL 10A, UL 14B and UL 14C for tin-clad *fire door* assemblies.
2. Floor *fire door* assemblies in accordance with Section 712.1.13.1.

716.2.1.1 Side-hinged or pivoted swinging doors. *Fire door* assemblies with side-hinged and pivoted swinging doors shall be tested in accordance with NFPA 252 or UL 10C. For tests conducted in accordance with NFPA 252, the fire test shall be conducted using the positive pressure method specified in the standard.

716.2.1.2 Other types of assemblies. *Fire door* assemblies with other types of doors, including swinging elevator doors, horizontal sliding fire doors, rolling steel *fire doors*, fire shutters, bottom- and side-hinged chute intake doors, and top-hinged chute discharge doors, shall be tested in accordance with NFPA 252 or UL 10B. For tests conducted in accordance with NFPA 252, the neutral pressure plane in the furnace shall be maintained as nearly equal to the atmospheric pressure as possible at the top of the door, as specified in the standard.

716.2.1.3 Glazing in transoms lights and sidelights in corridors and smoke barriers. Glazing material in any other part of the door assembly, including transom lights and sidelights, shall be tested in accordance with NFPA 257 or UL 9, including the hose stream test, in accordance with Section 716.3.1.1.

716.2.1.4 Smoke and draft control. *Fire door* assemblies that serve as smoke and draft control assemblies shall be tested in accordance with UL 1784.

716.2.5.3 Glazing in door assemblies in corridors and smoke barriers. In a 20-minute *fire door assembly*, the glazing material in the door itself shall have a minimum fire-protection-rated glazing of 20 minutes and shall be exempt from the hose stream test.

716.2.5.4 Fire door frames with transom lights and sidelights. Fire-protection-rated glazing shall be permitted in door frames with transom lights, sidelights or both, where a 3/4-hour *fire protection rating* or less is required and in 2-hour fire-resistance-rated exterior walls in accordance with Table 716.1(2). *Fire door* frames with transom lights, sidelights, or both, installed with fire-resistance-rated glazing tested as an assembly in accordance with ASTM E119 or UL 263 shall be permitted where a *fire protection rating* exceeding 3/4 hour is required in accordance with Table 716.1(2).

716.2.6 Fire door hardware and closures. *Fire door* hardware and closures shall be installed on *fire door assemblies* in accordance with the requirements of this section.

716.2.6.1 Door closing. *Fire doors* shall be latching and self- or automatic-closing in accordance with this section.

Exceptions:

1. *Fire doors* located in common walls separating *sleeping units* in Group R-1 shall be permitted without automatic- or *self-closing* devices.
2. The elevator car doors and the associated hoistway enclosure doors at the floor level designated for recall in accordance with ((~~Section 3003.2~~)) Chapter 30 shall be permitted to remain open during Phase I emergency recall operation.
3. In Group I-1, Condition 2 *Assisted living facilities* licensed under chapter 388-78A WAC and residential treatment facilities licensed under chapter 246-337 WAC, fire doors in dwelling and sleeping units opening to the *corridor* shall be permitted without automatic or self-closing devices when all of the following conditions exist:
   - 3.1 Each floor is constantly attended by staff on a 24-hour basis and stationed on that floor;
   - 3.2 The facility is provided with an NFPA 13 sprinkler system throughout;
   - 3.3 Doors shall be equipped with positive latching;
   - 3.4 Dwelling and sleeping units are not equipped with cooking appliances;
   - 3.5 Dwelling and sleeping units shall be equipped with a smoke detection system interconnected with the smoke detection system required by Section 907.2.6.1.

716.2.6.2 Latch required. Unless otherwise specifically permitted, *single side-hinged swinging fire doors* and both leaves of pairs of side-hinged swinging *fire doors* shall be provided with an active latch bolt that will secure the door when it is closed.

716.2.6.3 Chute intake door latching. Chute intake doors shall be positive latching, remaining latched and closed in the event of latch spring failure during a fire emergency.

716.2.6.4 Automatic-closing fire door assemblies. Automatic-closing *fire door* assemblies shall be *self-closing* in accordance with NFPA 80.

716.2.6.5 Delayed-action closers. Doors required to be *self-closing* and not required to be automatic closing shall be permitted to be equipped with delayed-action closers.

716.2.6.6 Smoke-activated doors. Automatic-closing doors installed in the following locations shall be permitted to have hold-open devices. Doors shall automatically close by the actuation of smoke detectors installed in accordance with Section 907.3 or by loss of power to the smoke detector or hold-open device. Doors that are automatic-closing by smoke detection shall not have more than a 10-second delay before the door starts to close after the smoke detector is actuated. Automatic-closing doors that protect openings installed in the following locations shall comply with this section:

1. In walls that separate incidental uses in accordance with Section 509.4.
2. In *fire walls* in accordance with Section 706.8.
3. In *fire barriers* in accordance with Section 707.6.
4. In *fire partitions* in accordance with Section 708.6.
5. In *smoke barriers* in accordance with Section 709.5.
6. In *smoke partitions* in accordance with Section 710.5.2.3.
7. In shaft enclosures in accordance with Section 713.7.
8. In waste and linen chutes, discharge openings and access and discharge rooms in accordance with Section 713.13. Loading doors installed in waste and linen chutes shall meet the requirements of Sections 716.2.6.1 and 716.2.6.3.
9. Additional doors provided at elevator hoistway door openings installed in accordance with Section 713.14.3 item 3.

717.3 Damper testing, ratings and actuation. *Damper* testing, ratings and actuation shall be in accordance with Sections 717.3.1 through 717.3.3.

717.3.1 Damper testing. *Dampers* shall be listed and labeled in accordance with the standards in this section.

1. *Fire dampers* shall comply with the requirements of UL 555. Only *fire dampers* labeled for use in dynamic systems shall be installed in heating, ventilation and air-conditioning systems designed to operate with fans on during a fire.
2. *Smoke dampers* shall comply with the requirements of UL 555S.
3. *Combination fire/smoke dampers* shall comply with the requirements of both UL 555 and UL 555S.
4. *Ceiling radiation dampers* shall comply with the requirements of UL 555C or shall be tested as part of a fire-resistance-rated floor/ceiling or roof/ceiling assembly in accordance with ASTM E119 or UL 263. Only *ceiling radiation dampers* labeled for use in dynamic systems shall be installed in heating, ventilation and air-conditioning systems designed to operate with fans on during a fire.
5. *Corridor dampers* shall comply with requirements of both UL 555 and UL 555S. *Corridor dampers* shall demonstrate acceptable closure performance when subjected to 150 feet per minute (0.76 mps) velocity across the face of the damper during the UL 555 fire exposure test.

717.3.2 Damper rating. *Damper* ratings shall be in accordance with Sections 717.3.2.1 through 717.3.2.4.

717.3.2.1 Fire damper ratings. *Fire dampers* shall have the minimum *rating* specified in Table 717.3.2.1.

TABLE 717.3.2.1
FIRE DAMPER RATING

TYPE OF PENETRATION	MINIMUM DAMPER RATING (hours)
Less than 3-hour fire-resistance-rated assemblies	1.5
3-hour or greater fire-resistance-rated assemblies	3

717.3.2.2 Smoke damper ratings. *Smoke damper* leakage ratings shall be Class I or II. Elevated temperature ratings shall be not less than 250°F (121°C).

717.3.2.3 Combination fire/smoke damper ratings. *Combination fire/smoke dampers* shall have the minimum *rating* specified for *fire dampers* in Table 717.3.2.1 and shall have the minimum rating specified for *smoke dampers* in Section 717.3.2.2.

717.3.2.4 Corridor damper ratings. *Corridor dampers* shall have the following minimum ratings:

1. One hour *fire-resistance rating*.
2. Class I or II leakage rating as specified in Section 717.3.2.2.

717.3.3 Damper actuation. *Damper* actuation shall be in accordance with Sections 717.3.3.1 through 717.3.3.5 as applicable.

717.3.3.1 Fire damper actuation device. The *fire damper* actuation device shall meet one of the following requirements:

1. The operating temperature shall be approximately 50°F (10°C) above the normal temperature within the duct system, but not less than 160°F (71°C).
2. The operating temperature shall be not more than 350°F (177°C) where located in a smoke control system complying with Section 909.

Interpretation I717.3: Dampers associated with exhaust fans used for hoistway and stair pressurization are permitted to comply with Section 717.3.3.1, item 2.

717.3.3.2 Smoke damper actuation. The *smoke damper* shall close upon actuation of a *listed* smoke detector or detectors installed in accordance with Section 907.3 and one of the following methods, as applicable:

1. Where a *smoke damper* is installed within a duct, a smoke detector shall be installed inside the duct or outside the duct with sampling tubes protruding into the duct. The detector or tubes within the duct shall be within 5 feet (1524 mm) of the *damper*. Air outlets and inlets shall not be located between the detector or tubes and the *damper*. The detector shall be *listed* for the air velocity, temperature and humidity anticipated at the point where it is installed. Other than in mechanical smoke control systems, *dampers* shall be closed upon fan shutdown where local smoke detectors require a minimum velocity to operate.

2. Where a *smoke damper* is installed above *smoke barrier* doors in a *smoke barrier*, a spot-type detector shall be installed on either side of the *smoke barrier* door opening. The detector shall be listed for releasing service if used for direct interface with the *damper*.
3. Where a *smoke damper* is installed within an air transfer opening in a wall, a spot-type detector shall be installed within 5 feet (1524 mm) horizontally of the *damper*. The detector shall be listed for releasing service if used for direct interface with the *damper*.
4. Where a *smoke damper* is installed in a *corridor* wall or ceiling, the *damper* shall be permitted to be controlled by a smoke detection system installed in the *corridor*.
5. Where a smoke detection system is installed in all areas served by the duct in which the *damper* will be located, the *smoke dampers* shall be permitted to be controlled by the smoke detection system.

717.3.3.3 Combination fire/smoke damper actuation. *Combination fire/smoke damper* actuation shall be in accordance with Sections 717.3.3.1 and 717.3.3.2. *Combination fire/smoke dampers* installed in smoke control system shaft penetrations shall not be activated by local area smoke detection unless it is secondary to the smoke management system controls.

717.3.3.4 Ceiling radiation damper actuation. The operating temperature of a *ceiling radiation damper* actuation device shall be 50°F (27.8°C) above the normal temperature within the duct system, but not less than 160°F (71°C).

717.3.3.5 Corridor damper actuation. *Corridor damper* actuation shall be in accordance with Sections 717.3.3.1 and 717.3.3.2.

717.4 Access and identification. Fire and smoke *dampers* shall be provided with an *approved* means of access that is large enough to *permit* inspection and maintenance of the *damper* and its operating parts. The access shall not affect the integrity of fire-resistance-rated assemblies. The access openings shall not reduce the *fire-resistance rating* of the assembly. Access points shall be permanently identified on the exterior by a *label* having letters not less than 1/2 inch (12.7 mm) in height reading: FIRE/SMOKE DAMPER, SMOKE DAMPER or FIRE DAMPER. Access doors in ducts shall be tight fitting and suitable for the required duct construction.

[W][S] 717.5 Where required. *Fire dampers, smoke dampers, combination fire/smoke dampers, ceiling radiation dampers* and *corridor dampers* shall be provided at the locations prescribed in Sections 717.5.1 through 717.5.7 and 717.6. Where an assembly is required to have both *fire dampers* and *smoke dampers, combination fire/smoke dampers* or a *fire damper* and a *smoke damper* shall be provided.

717.5.1 Fire walls. Ducts and air transfer openings permitted in *fire walls* in accordance with Section 706.11 shall be protected with *listed fire dampers* installed in accordance with their listing.

717.5.1.1 Horizontal exits. A *listed smoke damper* designed to resist the passage of smoke shall be provided at each point a duct or air transfer opening penetrates a *fire wall* that serves as a horizontal *exit*.

[W] 717.5.2 Fire barriers. Ducts and air transfer openings of *fire barriers* shall be protected with *listed fire dampers* installed in accordance with their listing. Ducts and air transfer openings shall not penetrate enclosures for *interior exit stairways* and *ramps* and *exit passageways*, except as permitted by Sections 1023.5 and 1024.6, respectively.

Exception: *Fire dampers* are not required at penetrations of *fire barriers* where any of the following apply:

1. Penetrations are tested in accordance with ASTM E119 or UL 263 as part of the fire-resistance-rated assembly.
2. Ducts are used as part of an *approved* smoke control system in accordance with Section 909 and where the use of a *fire damper* would interfere with the operation of a smoke control system.
3. Such walls ((~~are~~)) shall have a required fire-resistance rating of 1 hour or less, penetrated by ducted HVAC systems, ((~~have a required *fire resistance rating* of 1 hour or less, are~~)) in areas of other than Group H and are in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2. For the purposes of this exception, a ducted HVAC system shall be a duct system for conveying supply, return or exhaust air as part of the structure's HVAC system. Such a duct system shall be constructed of sheet steel not less than No. 26 gage thickness without openings and shall be continuous from the air-handling appliance or equipment to the air outlet and inlet terminals located on the opposite side of the wall assembly.

717.5.2.1 Horizontal exits. A *listed smoke damper* designed to resist the passage of smoke shall be provided at each point a duct or air transfer opening penetrates a *fire barrier* that serves as a horizontal *exit*.

[S] 717.5.3 Shaft enclosures. Shaft enclosures that are permitted to be penetrated by ducts and air transfer openings shall be protected with *listed* fire and smoke *dampers* installed in accordance with their listing.

Exceptions:

1. *Fire dampers* are not required at penetrations of shafts where any of the following criteria are met:
   1.1. Steel exhaust subducts are extended not less than 22 inches (559 mm) vertically in exhaust shafts, provided that there is a continuous airflow upward to the outside.

1.2. Penetrations are tested in accordance with ASTM E119 or UL 263 as part of the fire-resistance-rated assembly.

1.3. Ducts are used as part of an *approved* smoke control system designed and installed in accordance with Section 909 and where the *fire damper* will interfere with the operation of the smoke control system.

1.4. The penetrations are in parking garage exhaust or supply shafts that are separated from other building shafts by not less than 2-hour fire-resistance-rated construction.

2. In Group B and R occupancies equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, *smoke dampers* are not required at penetrations of shafts where all of the following criteria are met:

2.1. Kitchen, clothes dryer, bathroom, ((~~and~~)) toilet room, accessory storage, and accessory trash room exhaust openings are installed with steel exhaust subducts, having a minimum wall thickness of 0.0187-inch (0.4712 mm) (No. 26 gage).

2.2. The subducts extend not less than 22 inches (559 mm) vertically.

2.3. An exhaust fan is installed at the upper terminus of the shaft that is ((~~powered continuously in accordance with the provisions of Section 909.11,~~)) provided with a *legally required standby power system* in accordance with Seattle Electrical Code Section 701 so as to maintain a continuous upward airflow to the outside.

3. *Smoke dampers* are not required at penetration of exhaust or supply shafts in parking garages that are separated from other building shafts by not less than 2-hour fire-resistance-rated construction.

4. *Smoke dampers* are not required at penetrations of shafts where ducts are used as part of an *approved* mechanical smoke control system designed in accordance with Section 909 and where the *smoke damper* will interfere with the operation of the smoke control system.

5. *Fire dampers* and *combination fire/smoke dampers* are not required in kitchen and clothes dryer exhaust systems where *dampers* are prohibited by the *International Mechanical Code*.

[W] 717.5.4 Fire partitions. Ducts and air transfer openings that penetrate *fire partitions* shall be protected with *listed fire dampers* installed in accordance with their listing.

Exceptions: In occupancies other than Group H, *fire dampers* are not required where any of the following apply:

1. Corridor walls in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2 and the duct is protected as a *through penetration* in accordance with Section 714.

2. Tenant partitions in *covered and open mall buildings* where the walls are not required by provisions elsewhere in the code to extend to the underside of the floor or roof sheathing, slab or deck above.

3. The duct system is constructed of *approved* materials in accordance with the *International Mechanical Code* and the duct penetrating the wall complies with all of the following requirements:

3.1. The duct shall not exceed 100 square inches (0.06 m^2).

3.2. The duct shall be constructed of steel not less than 0.0217 inch (0.55 mm) in thickness.

3.3. The duct shall not have openings that communicate the *corridor* with adjacent spaces or rooms.

3.4. The duct shall be installed above a ceiling.

3.5. The duct shall not terminate at a wall register in the fire-resistance-rated wall.

3.6. A minimum 12-inch-long (305 mm) by 0.060-inch-thick (1.52 mm) steel sleeve shall be centered in each duct opening. The sleeve shall be secured to both sides of the wall and all four sides of the sleeve with minimum 1-1/2-inch by 1-1/2-inch by 0.060-inch (38 mm by 38 mm by 1.52 mm) steel retaining angles. The retaining angles shall be secured to the sleeve and the wall with No. 10 (M5) screws. The *annular space* between the steel sleeve and the wall opening shall be filled with *mineral wool* batting on all sides.

4. Such walls shall have a required fire-resistance rating of 1 hour or less, ((~~are~~)) penetrated by ducted HVAC systems ((~~, have a required *fire-resistance rating* of 1 hour or less,~~)) in areas of other than Group H and are in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2. For the purposes of this exception, a ducted HVAC system shall be a duct system for conveying supply, return or exhaust air as part of the structure's HVAC system. Such a duct system shall be constructed of sheet steel not less than No. 26 gage thickness and shall be continuous without openings from the air-handling appliance or equipment to the air outlet and inlet terminals located on the opposite side of the wall assembly.

717.5.4.1 Corridors. Duct and air transfer openings that penetrate *corridors* shall be protected with *dampers* as follows:

1. A *corridor damper* shall be provided where corridor ceilings, constructed as required for the corridor walls as permitted in Section 708.4, Exception 3, are penetrated.

1. A shaft enclosure in accordance with Section 713.
2. A *listed ceiling radiation damper* installed at the ceiling line where a duct penetrates the ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly.

   Exceptions:

   1. A fire-resistance-rated assembly tested in accordance with ASTM E119 or UL 263 showing that *ceiling radiation dampers* are not required in order to maintain the fire-resistance rating of the assembly.
   2. Where exhaust duct or outdoor air duct penetrations protected in accordance with Section 714.5.2 are located within the cavity of a wall and do not pass through another dwelling unit or tenant space.
   3. Where duct and air transfer openings are protected with a duct outlet penetration system tested as part of a fire-resistance-rated assembly in accordance with ASTM E119 or UL 263.
3. A *listed ceiling radiation damper* installed at the ceiling line where a diffuser with no duct attached penetrates the ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly.

   Exceptions:

   1. A fire-resistance-rated assembly tested in accordance with ASTM E119 or UL 263 showing that *ceiling radiation dampers* are not required in order to maintain the fire-resistance rating of the assembly.
   2. Where duct and air transfer openings are protected with a duct outlet penetration system tested as part of a fire-resistance-rated assembly in accordance with ASTM E119 or UL 263.

717.6.2.1 Ceiling radiation dampers testing and installation. *Ceiling radiation dampers* shall be tested in accordance with Section 717.3.1. *Ceiling radiation dampers* shall be installed in accordance with the details *listed* in the fire-resistance-rated assembly and the manufacturer's instructions and the listing.

717.6.3 Nonfire-resistance-rated floor assemblies. Duct systems constructed of *approved* materials in accordance with the *International Mechanical Code* that penetrate nonfire-resistance-rated floor assemblies shall be protected by any of the following methods:

1. A shaft enclosure in accordance with Section 713.
2. The duct connects not more than two *stories*, and the *annular space* around the penetrating duct is protected with an *approved* noncombustible material that resists the free passage of flame and the products of combustion.
3. In floor assemblies composed of noncombustible materials, a shaft shall not be required where the duct connects not more than three stories, the *annular space* around the penetrating duct is protected with an approved noncombustible material that resists the free passage of flame and the products of combustion and a *fire damper* is installed at each floor line.

   Exception: *Fire dampers* are not required in ducts within individual residential *dwelling units*.

717.7 Flexible ducts and air connectors. Flexible ducts and air connectors shall not pass through any fire-resistance-rated assembly. Flexible air connectors shall not pass through any wall, floor or ceiling.

SECTION 718
CONCEALED SPACES

718.1 General. *Fireblocking* and draftstopping shall be installed in combustible concealed locations in accordance with this section. *Fireblocking* shall comply with Section 718.2. Draftstopping in floor/ceiling spaces and *attic* spaces shall comply with Sections 718.3 and 718.4, respectively. The permitted use of combustible materials in concealed spaces of buildings of Type I or II construction shall be limited to the applications indicated in Section 718.5.

[W] 718.2 Fireblocking. In combustible construction, *fireblocking* shall be installed to cut off concealed draft openings (both vertical and horizontal) and shall form an effective barrier between floors, between a top *story* and a roof or *attic* space. *Fireblocking* shall be installed in the locations specified in Sections 718.2.2 through 718.2.7.

718.2.1 Fireblocking materials. *Fireblocking* shall consist of the following materials:

1. Two-inch (51 mm) nominal lumber.
2. Two thicknesses of 1-inch (25 mm) nominal lumber with broken lap joints.
3. One thickness of 0.719-inch (18.3 mm) wood structural panels with joints backed by 0.719-inch (18.3 mm) wood structural panels.
4. One thickness of 0.75-inch (19.1 mm) particleboard with joints backed by 0.75-inch (19 mm) particleboard.
5. One-half-inch (12.7 mm) gypsum board.
6. One-fourth-inch (6.4 mm) cement-based millboard.

7. Batts or blankets of *mineral wool*, *mineral fiber* or other *approved* materials installed in such a manner as to be securely retained in place.
8. Cellulose insulation installed as tested for the specific application.
9. Mass timber complying with Section 2304.11.

718.2.1.1 Batts or blankets of mineral wool or mineral fiber. Batts or blankets of *mineral wool* or *mineral fiber* or other *approved* nonrigid materials shall be permitted for compliance with the 10-foot (3048 mm) horizontal *fireblocking* in walls constructed using parallel rows of studs or staggered studs.

718.2.1.2 Unfaced fiberglass. Unfaced fiberglass batt insulation used as *fireblocking* shall fill the entire cross section of the wall cavity to a minimum height of 16 inches (406 mm) measured vertically. Where piping, conduit or similar obstructions are encountered, the insulation shall be packed tightly around the obstruction.

718.2.1.3 Loose-fill insulation material. Loose-fill insulation material, insulating foam sealants and caulk materials shall not be used as a fireblock unless specifically tested in the form and manner intended for use to demonstrate its ability to remain in place and to retard the spread of fire and hot gases.

718.2.1.4 Fireblocking integrity. The integrity of fireblocks shall be maintained.

718.2.1.5 Double stud walls. Batts or blankets of mineral or glass fiber or other *approved* nonrigid materials shall be allowed as *fireblocking* in walls constructed using parallel rows of studs or staggered studs.

718.2.2 Concealed wall spaces. *Fireblocking* shall be provided in concealed spaces of stud walls and partitions, including furred spaces, and parallel rows of studs or staggered studs, as follows:

1. Vertically at the ceiling and floor levels.
2. Horizontally at intervals not exceeding 10 feet (3048 mm).

718.2.3 Connections between horizontal and vertical spaces. *Fireblocking* shall be provided at interconnections between concealed vertical stud wall or partition spaces and concealed horizontal spaces created by an assembly of floor joists or trusses, and between concealed vertical and horizontal spaces such as occur at soffits, drop ceilings, cove ceilings and similar locations.

718.2.4 Stairways. *Fireblocking* shall be provided in concealed spaces between *stair* stringers at the top and bottom of the run. Enclosed spaces under *stairways* shall comply with Section 1011.7.3.

718.2.5 Ceiling and floor openings. Where required by Section 712.1.8, Exception 1 of Section 714.5.1.2 or Section 714.6, *fireblocking* of the *annular space* around vents, pipes, ducts, chimneys and fireplaces at ceilings and floor levels shall be installed with a material specifically tested in the form and manner intended for use to demonstrate its ability to remain in place and resist the free passage of flame and the products of combustion.

718.2.5.1 Factory-built chimneys and fireplaces. Factory-built chimneys and fireplaces shall be fireblocked in accordance with UL 103 and UL 127.

718.2.6 Exterior wall coverings. *Fireblocking* shall be installed within concealed spaces of exterior wall coverings and other exterior architectural elements where permitted to be of combustible construction as specified in Section 1405 or where erected with combustible frames. *Fireblocking* shall be installed at maximum intervals of 20 feet (6096 mm) in either dimension so that there will be no concealed space exceeding 100 square feet (9.3 m^2) between *fireblocking*. Where wood furring strips are used, they shall be of approved wood of natural decay resistance or preservative-treated wood. If noncontinuous, such elements shall have closed ends, with not less than 4 inches (102 mm) of separation between sections.

Exceptions:

1. *Fireblocking* of cornices is not required in single-family *dwellings*. *Fireblocking* of cornices of a two-family *dwelling* is required only at the line of *dwelling unit* separation.
2. *Fireblocking* shall not be required where the exterior wall covering is installed on noncombustible framing and the face of the exterior wall covering exposed to the concealed space is covered by one of the following materials:
   - 2.1. Aluminum having a minimum thickness of 0.019 inch (0.5 mm).
   - 2.2. Corrosion-resistant steel having a base metal thickness not less than 0.016 inch (0.4 mm) at any point.
   - 2.3. Other *approved* noncombustible materials.
3. *Fireblocking* shall not be required where the exterior wall covering has been tested in accordance with, and complies with the acceptance criteria of, NFPA 285. The exterior wall covering shall be installed as tested in accordance with NFPA 285.

718.2.7 Concealed sleeper spaces. Where wood sleepers are used for laying wood flooring on masonry or concrete fire-resistance-rated floors, the space between the floor slab and the underside of the wood flooring shall be filled with an *approved* material to resist the free passage of flame and products of combustion or fireblocked in such a manner that open

spaces under the flooring shall not exceed 100 square feet (9.3 m^2) in area and such space shall be filled solidly under permanent partitions so that communication under the flooring between adjoining rooms shall not occur.

Exceptions:

1. *Fireblocking* is not required for slab-on-grade floors in gymnasiums.
2. *Fireblocking* is required only at the juncture of each alternate lane and at the ends of each lane in a bowling facility.

718.3 Draftstopping in floors. Draftstopping shall be installed to subdivide floor/ceiling assemblies where required by Section 708.4.2. In other than Group R occupancies, draftstopping shall be installed to subdivide combustible floor/ceiling assemblies so that horizontal floor areas do not exceed 1,000 square feet (93 m^2).

Exception: Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

718.3.1 Draftstopping materials. Draftstopping materials shall be not less than 1/2-inch (12.7 mm) gypsum board, 3/8-inch (9.5 mm) wood structural panel, 3/8-inch (9.5 mm) particleboard, 1-inch (25-mm) nominal lumber, cement fiberboard, batts or blankets of *mineral wool* or glass fiber, or other *approved* materials adequately supported. The integrity of *draftstops* shall be maintained. *

718.4 Draftstopping in attics. Draftstopping shall be installed to subdivide *attic* spaces where required by Section 708.4.2. In other than Group R, draftstopping shall be installed to subdivide combustible attic spaces and combustible concealed roof spaces such that any horizontal area does not exceed 3,000 square feet (279 m^2). Ventilation of concealed roof spaces shall be maintained in accordance with Section 1202.2.1.

Exception: Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

718.4.1 Draftstopping materials. Materials utilized for draftstopping of *attic* spaces shall comply with Section 718.3.1.

718.4.1.1 Openings. Openings in the partitions shall be protected by *self-closing* doors with automatic latches constructed as required for the partitions. *

[S] 718.5 Combustible materials in concealed spaces in Type I or II construction. Combustible materials shall not be permitted in concealed spaces of buildings of Type I or II construction.

Exceptions:

1. Combustible materials in accordance with Section 603.
2. Combustible materials exposed within plenums complying with Section 602 of the *International Mechanical Code*.
3. Class A *interior finish* materials classified in accordance with Section 803.
4. Combustible piping within partitions or shaft enclosures installed in accordance with the provisions of this code.
5. Combustible piping within concealed ceiling spaces installed in accordance with the *International Mechanical Code* and the ((~~*International*~~)) *Uniform Plumbing Code*.
6. Combustible insulation and covering on pipe and tubing, installed in concealed spaces other than plenums, complying with Section 720.7.

SECTION 719
FIRE-RESISTANCE REQUIREMENTS FOR PLASTER

719.1 Thickness of plaster. The minimum thickness of gypsum plaster or Portland cement plaster used in a fire-resistance-rated system shall be determined by the prescribed fire tests. The plaster thickness shall be measured from the face of the lath where applied to gypsum lath or metal lath.

719.2 Plaster equivalents. For *fire-resistance* purposes, 1/2 inch (12.7 mm) of unsanded gypsum plaster shall be deemed equivalent to 3/4 inch (19.1 mm) of one-to-three gypsum sand plaster or 1 inch (25 mm) of Portland cement sand plaster.

719.3 Noncombustible furring. In buildings of Type I and II construction, plaster shall be applied directly on concrete or masonry or on *approved* noncombustible plastering base and furring.

719.4 Double reinforcement. Plaster protection more than 1 inch (25 mm) in thickness shall be reinforced with an additional layer of *approved* lath embedded not less than 3/4 inch (19.1 mm) from the outer surface and fixed securely in place.

Exception: Solid plaster partitions or where otherwise determined by fire tests.

719.5 Plaster alternatives for concrete. In reinforced concrete construction, gypsum plaster or Portland cement plaster is permitted to be substituted for 1/2 inch (12.7 mm) of the required poured concrete protection, except that a minimum thickness of 3/8 inch (9.5 mm) of poured concrete shall be provided in reinforced concrete floors and 1 inch (25 mm) in reinforced concrete columns in addition to the plaster finish. The concrete base shall be prepared in accordance with Section 2510.7.

membrane consisting of a subfloor and finished floor conforming to Table 722.6.2(4) or any other membrane that has a contribution to *fire resistance* of not less than 15 minutes in Table 722.6.2(1).

722.6.2.5 Additional protection. Table 722.6.2(5) indicates the time increments to be added to the *fire resistance* where glass fiber, rockwool, slag *mineral wool* or cellulose insulation is incorporated in the assembly.

722.6.2.6 Fastening. Fastening of wood frame assemblies and the fastening of membranes to the wood framing members shall be done in accordance with Chapter 23.

[W] 722.7 Fire-resistance rating of mass timber. The required fire resistance of mass timber elements in Section 602.4 shall be determined in accordance with Section 703.2 or 703.3. The fire-resistance rating of building elements shall be as required in Tables 601 and 602 and as specified elsewhere in this code. The fire-resistance rating of the mass timber elements shall consist of the fire resistance of the unprotected element added to the protection time of the noncombustible protection.

722.7.1 Minimum required protection. When required by Sections 602.4.1 through 602.4.3, noncombustible protection shall be provided for mass timber building elements in accordance with Table 722.7.1(1). The rating, in minutes, contributed by the noncombustible protection of mass timber building elements, components, or assemblies, shall be established in accordance with Section 703.8. The protection contributions indicated in Table 722.7.1(2) shall be deemed to comply with this requirement when installed and fastened in accordance with Section 722.7.2.

TABLE 722.7.1(1)
PROTECTION REQUIRED FROM NONCOMBUSTIBLE COVERING MATERIAL

REQUIRED FIRE-RESISTANCE RATING OF BUILDING ELEMENT PER TABLES 601 AND 602 (HOURS)	MINIMUM PROTECTION REQUIRED FROM NONCOMBUSTIBLE PROTECTION (MINUTES)
1	40
2	80
3 or more	120

TABLE 722.7.1(2)
PROTECTION PROVIDED BY NONCOMBUSTIBLE COVERING MATERIAL

NONCOMBUSTIBLE PROTECTION	PROTECTION CONTRIBUTION (MINUTES)
1/2 inch Type X Gypsum board	25
5/8 inch Type X Gypsum board	40

722.7.2 Installation of gypsum board noncombustible protection. Gypsum board complying with Table 722.7.1(2) shall be installed in accordance with this section.

722.7.2.1 Interior surfaces. Layers of Type X gypsum board serving as noncombustible protection for interior surfaces of wall and ceiling assemblies determined in accordance with Table 722.7.1(1) shall be installed in accordance with the following:

1. Each layer shall be attached with Type S drywall screws of sufficient length to penetrate the mass timber at least 1 inch when driven flush with the paper surface of the gypsum board.

   EXCEPTION: The third layer, where determined necessary by Section 722.7, shall be permitted to be attached with 1 inch #6 Type S drywall screws to furring channels in accordance with ASTM C645.

2. Screws for attaching the base layer shall be 12 inches on center in both directions.
3. Screws for each layer after the base layer shall be 12 inches on center in both directions and offset from the screws of the previous layers by 4 inches in both directions.
4. All panel edges of any layer shall be offset 18 inches from those of the previous layer.
5. All panel edges shall be attached with screws sized and offset as in items 1 through 4 above and placed at least 1 inch but not more than 2 inches from the panel edge.
6. All panels installed at wall-to-ceiling intersections shall be installed such that the ceiling panel(s) is installed first and the wall panel(s) is installed after the ceiling panel has been installed and is fitted tight to the ceiling panel. Where multiple layers are required, each layer shall repeat this process.
7. All panels installed at a wall-to-wall intersection shall be installed such that the panel(s) covering an exterior wall or a wall with a greater fire-resistance rating shall be installed first and the panel(s) covering the other wall shall be fitted tight to the panel covering the first wall. Where multiple layers are required, each layer shall repeat this process.
8. Panel edges of the face layer shall be taped and finished with joint compound. Fastener heads shall be covered with joint compound.
9. Panel edges protecting mass timber elements adjacent to unprotected mass timber elements in accordance with Section 602.4.2.2 shall be covered with 1 1/4 inch metal corner bead and finished with joint compound.

[W] 722.7.2.2 Exterior surfaces. Layers of Type X gypsum board serving as noncombustible protection for the outside of the exterior heavy timber walls determined in accordance with Table 722.7.1(a) shall be fastened 12 inches on center each way and 6 inches on center at all joints or ends. All panel edges shall be attached with fasteners located at least 1 inch but not more than 2 inches from the panel edge. Fasteners shall comply with one of the following:

1. Galvanized nails of minimum 12 gage with a 7/16 inch head of sufficient length to penetrate the mass timber a minimum of 1 inch.
2. Screws that comply with ASTM C1002 (Type S, Type W, or Type G) of sufficient length to penetrate the mass timber a minimum of 1 inch.

803.1.2 Interior wall and ceiling finish materials tested in accordance with ASTM E84 or UL 723. *Interior wall* and *ceiling finish* materials shall be classified in accordance with ASTM E84 or UL 723. Such *interior finish* materials shall be grouped in the following classes in accordance with their flame spread and *smoke-developed indices*.

Class A = *Flame spread index* 0–25; *smoke-developed index 0–450*.

Class B = *Flame spread index* 26–75; *smoke-developed index 0–450*.

Class C = *Flame spread index* 76–200; *smoke-developed index 0–450*.

Exception: Materials tested in accordance with Section 803.1.1 and as indicated in Sections 803.1.3 through 803.13.

803.1.3 Interior wall and ceiling finish materials with different requirements. The materials indicated in Sections 803.2 through 803.13 shall be tested as indicated in the corresponding sections.

803.2 Thickness exemption. Materials having a thickness less than 0.036 inch (0.9 mm) applied directly to the surface of walls or ceilings shall not be required to be tested.

[W] 803.3 Heavy timber exemption. Exposed portions of building elements complying with the requirements for buildings of ((~~heavy timber~~)) Type IV construction in Section 602.4 ((~~or Section 2304.11~~)) shall not be subject to *interior finish* requirements except in interior exit stairways, interior exit ramps, and exit passageways.

803.4 Foam plastics. Foam plastics shall not be used as *interior finish* except as provided in Section 2603.9. This section shall apply both to exposed foam plastics and to foam plastics used in conjunction with a textile or vinyl facing or cover.

803.5 Textile wall coverings. Where used as interior wall finish materials, textile wall coverings, including materials having woven or nonwoven, napped, tufted, looped or similar surface and carpet and similar textile materials, shall be tested in the manner intended for use, using the product-mounting system, including adhesive, and shall comply with the requirements of one of the following: Section 803.1.1, 803.5.1 or 803.5.2.

803.5.1 Room corner test for textile wall coverings and expanded vinyl wall coverings. Textile wall coverings and *expanded vinyl wall coverings* shall meet the criteria of Section 803.5.1.1 when tested in the manner intended for use in accordance with the Method B protocol of NFPA 265 using the product-mounting system, including adhesive.

803.5.1.1 Acceptance criteria for NFPA 265. The *interior finish* shall comply with the following:

1. During the 40 kW exposure, flames shall not spread to the ceiling.
2. The flame shall not spread to the outer extremities of the samples on the 8-foot by 12-foot (203 by 305 mm) walls.
3. Flashover, as defined in NFPA 265, shall not occur.
4. The total smoke release throughout the test shall not exceed 1,000 m^2.

803.5.2 Acceptance criteria for textile and expanded vinyl wall or ceiling coverings tested to ASTM E84 or UL 723. Textile wall and ceiling coverings and expanded vinyl wall and ceiling coverings shall have a Class A *flame spread index* in accordance with ASTM E84 or UL 723 and be protected by an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2. Test specimen preparation and mounting shall be in accordance with ASTM E2404.

803.6 Textile ceiling coverings. Where used as interior ceiling finish materials, textile ceiling coverings, including materials having woven or nonwoven, napped, tufted, looped or similar surface and carpet and similar textile materials, shall be tested in the manner intended for use, using the product-mounting system, including adhesive, and shall comply with the requirements of Section 803.1.1 or 803.5.2.

803.7 Expanded vinyl wall coverings. Where used as interior wall finish materials, *expanded vinyl wall coverings* shall be tested in the manner intended for use, using the product-mounting system, including adhesive, and shall comply with the requirements of one of the following: Section 803.1.1, 803.5.1 or 803.5.2.

803.8 Expanded vinyl ceiling coverings. Where used as interior ceiling finish materials, expanded vinyl ceiling coverings shall be tested in the manner intended for use, using the product mounting system, including adhesive, and shall comply with the requirements of Section 803.1.1 or 803.5.2.

803.9 High-density polyethylene (HDPE) and polypropylene (PP). Where high-density polyethylene or polypropylene is used as an *interior finish*, it shall comply with Section 803.1.1.

803.10 Site-fabricated stretch systems. Where used as interior wall or interior ceiling finish materials, *site-fabricated stretch systems* containing all three components described in the definition in Chapter 2 shall be tested in the manner intended for use, and shall comply with the requirements of Section 803.1.1 or 803.1.2. If the materials are tested in accordance with ASTM E84 or UL 723, specimen preparation and mounting shall be in accordance with ASTM E2573.

803.11 Laminated products factory produced with a wood substrate. Laminated products factory produced with a wood substrate shall comply with one of the following:

1. The laminated product shall meet the criteria of Section 803.1.1.1 when tested in accordance with NFPA 286 using the product-mounting system, including adhesive, as described in Section 5.8 of NFPA 286.

SECTION 804
INTERIOR FLOOR FINISH

804.1 General. *Interior floor finish* and floor covering materials shall comply with Sections 804.2 through 804.4.2.

Exception: Floor finishes and coverings of a traditional type, such as wood, vinyl, linoleum or terrazzo, and resilient floor covering materials that are not comprised of fibers.

804.2 Classification. *Interior floor finish* and floor covering materials required by Section 804.4.2 to be of Class I or II materials shall be classified in accordance with ASTM E648 or NFPA 253. The classification referred to herein corresponds to the classifications determined by ASTM E648 or NFPA 253 as follows: Class I, 0.45 watts/cm^2 or greater; Class II, 0.22 watts/cm^2 or greater.

804.3 Testing and identification. *Interior floor finish* and floor covering materials shall be tested by an agency in accordance with ASTM E648 or NFPA 253 and identified by a hang tag or other suitable method so as to identify the manufacturer or supplier and style, and shall indicate the *interior floor finish* or floor covering classification in accordance with Section 804.2. Carpet-type floor coverings shall be tested as proposed for use, including underlayment. Test reports confirming the information provided in the manufacturer's product identification shall be furnished to the building official upon request.

804.4 Interior floor finish requirements. Interior floor covering materials shall comply with Sections 804.4.1 and 804.4.2 and *interior floor finish* materials shall comply with Section 804.4.2.

804.4.1 Test requirement. In all occupancies, interior floor covering materials shall comply with the requirements of the DOC FF-1 "pill test" (CPSC 16 CFR Part 1630) or with ASTM D2859.

804.4.2 Minimum critical radiant flux. In all occupancies, *interior floor finish* and floor covering materials in enclosures for stairways and ramps, exit passageways, corridors and rooms or spaces not separated from corridors by partitions extending from the floor to the underside of the ceiling shall withstand a minimum critical radiant flux. The minimum critical radiant flux shall be not less than Class I in Groups I-1, I-2 and I-3 and not less than Class II in Groups A, B, E, H, I-4, M, R-1, R-2 and S.

Exception: Where a building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2, Class II materials are permitted in any area where Class I materials are required, and materials complying with DOC FF-1 "pill test" (CPSC 16 CFR Part 1630) or with ASTM D2859 are permitted in any area where Class II materials are required.

SECTION 805
COMBUSTIBLE MATERIALS IN TYPES I AND II CONSTRUCTION

805.1 Application. Combustible materials installed on or embedded in floors of buildings of Type I or II construction shall comply with Sections 805.1.1 through 805.1.3.

Exception: Stages and platforms constructed in accordance with Sections 410.2 and 410.3, respectively.

805.1.1 Subfloor construction. Floor sleepers, bucks and nailing blocks shall not be constructed of combustible materials, unless the space between the fire-resistance-rated floor assembly and the flooring is either solidly filled with noncombustible materials or fireblocked in accordance with Section 718, and provided that such open spaces shall not extend under or through permanent partitions or walls.

[S] 805.1.2 Wood finish flooring. Wood finish flooring <u>or wood sheathing used as flooring</u> is permitted to be attached directly to the embedded or fireblocked wood sleepers and shall be permitted where cemented directly to the top surface of fire-resistance-rated floor assemblies or directly to a wood subfloor attached to sleepers as provided for in Section 805.1.1.

805.1.3 Insulating boards. Combustible insulating boards not more than 1/2 inch (12.7 mm) thick and covered with finish flooring are permitted where attached directly to a noncombustible floor assembly or to wood subflooring attached to sleepers as provided for in Section 805.1.1.

SECTION 806
DECORATIVE MATERIALS AND TRIM

[F] 806.1 General. The following requirements shall apply to all occupancies:

1. Furnishings or decorative materials of an explosive or highly flammable character shall not be used.
2. Fire-retardant coatings in existing buildings shall be maintained so as to retain the effectiveness of the treatment under service conditions encountered in actual use.
3. Furnishings or other objects shall not be placed to obstruct exits, access thereto, egress therefrom or visibility thereof.
4. The permissible amount of decorative vegetation and noncombustible decorative materials shall not be limited.

CHAPTER 9

FIRE PROTECTION AND LIFE SAFETY SYSTEMS

User note:

About this chapter: *Chapter 9 prescribes the minimum requirements for active fire protection equipment systems to perform the functions of detecting a fire, alerting the occupants or fire department of a fire emergency, mass notification, gas detection, controlling smoke and controlling or extinguishing the fire. Generally, the requirements are based on the occupancy, the height and the area of the building, because these are the factors that most affect fire-fighting capabilities and the relative hazard of a specific building or portion thereof. This chapter parallels and is substantially duplicated in Chapter 9 of the* International Fire Code®*.*

SECTION 901
GENERAL

901.1 Scope. The provisions of this chapter shall specify where fire protection and life safety systems are required and shall apply to the design, installation and operation of *fire protection systems*.

[S] 901.2 Fire protection systems. *Fire protection systems* shall be installed, repaired, operated and maintained in accordance with this code and the *International Fire Code*.

Any *fire protection system* for which an exception or reduction to the provisions of this code has been granted shall be considered to be a required system.

Exception: Any *fire protection system* or portion thereof not required by this code shall be permitted to be installed for partial or complete protection provided that such system meets the requirements of this code.

901.2.1 Certificates required. Individuals who install, inspect, test or maintain fire protection systems shall obtain the proper certificate from the *fire code official* as required by the *International Fire Code*.

901.3 Modifications. Persons shall not remove or modify any *fire protection system* installed or maintained under the provisions of this code or the *International Fire Code* without approval by the *building official*.

901.4 Threads. Threads provided for fire department connections to sprinkler systems, standpipes, yard hydrants or any other fire hose connection shall be compatible with the connections used by the local fire department.

[S] 901.5 Acceptance tests. *Fire protection systems* shall be tested in accordance with the requirements of this code and the *International Fire Code*. Where required, the tests shall be conducted in the presence of the *building official*. Tests required by this code, the *International Fire Code* and the standards listed in this code shall be conducted at the expense of the owner or the owner's authorized agent. It shall be unlawful to occupy portions of a structure until the systems required ((~~*fire protection systems*~~)) by this code and the International Fire Code within that portion of the structure have been tested and *approved*.

901.6 Supervisory service. Where required, *fire protection systems* shall be monitored by an approved supervising station in accordance with NFPA 72.

901.6.1 Automatic sprinkler systems. *Automatic sprinkler systems* shall be monitored by an *approved* supervising station.

Exceptions:

1. A supervising station is not required for *automatic sprinkler systems* protecting one- and two-family dwellings.
2. Limited area systems in accordance with Section 903.3.8.

[F] 901.6.2 Integrated testing. Where two or more fire protection or life safety systems are interconnected, the intended response of subordinate fire protection and life safety systems shall be verified when required testing of the initiating system is conducted. In addition, integrated testing shall be performed in accordance with Sections 901.6.2.1 and 901.6.2.2.

[F] 901.6.2.1 High-rise buildings. For high-rise buildings, integrated testing shall comply with NFPA 4, with an integrated test performed prior to issuance of the certificate of occupancy and at intervals not exceeding 10 years, unless otherwise specified by an integrated system test plan prepared in accordance with NFPA 4. If an equipment failure is detected during integrated testing, a repeat of the integrated test shall not be required, except as necessary to verify operation of fire protection or life safety functions that are initiated by equipment that was repaired or replaced.

[F] 901.6.2.2 Smoke control systems. Where a fire alarm system is integrated with a smoke control system as outlined in Section 909, integrated testing shall comply with NFPA 4, with an integrated test performed prior to issuance of the certificate of occupancy and at intervals not exceeding 10 years, unless otherwise specified by an integrated system test plan prepared in accordance with NFPA 4. If an equipment failure is detected during integrated testing, a repeat of the integrated test shall not be required, except as necessary to verify operation of fire protection or life safety functions that are initiated by equipment that was repaired or replaced.

901.6.3 Fire alarm systems. Fire alarm systems required by the provisions of Section 907.2 of this code and Sections 907.2 and 907.9 of the *International Fire Code* shall be monitored by an *approved* supervising station in accordance with Section 907.6.6 of this code.

Exceptions:

1. Single- and multiple-station smoke alarms required by Section 907.2.10.
2. Smoke detectors in Group I-3 occupancies.
3. Supervisory service is not required for *automatic sprinkler systems* in one- and two-family dwellings and townhouses.

901.6.4 Group H. Supervision and monitoring of emergency alarm, detection and automatic fire-extinguishing systems in Group H occupancies shall be in accordance with the *International Fire Code*.

901.7 Fire areas. Where buildings, or portions thereof, are divided into *fire areas* so as not to exceed the limits established for requiring a *fire protection system* in accordance with this chapter, such *fire areas* shall be separated by *fire walls* constructed in accordance with Section 706, fire barriers constructed in accordance with Section 707, or *horizontal assemblies* constructed in accordance with Section 711, or a combination thereof having a fire-resistance rating of not less than that determined in accordance with Section 707.3.10.

SECTION 902
FIRE PUMP AND RISER ROOM SIZE

[F] 902.1 Pump and riser room size. Where provided, fire pump rooms and *automatic sprinkler system* riser rooms shall be designed with adequate space for all equipment necessary for the installation, as defined by the manufacturer, with sufficient working room around the stationary equipment. Clearances around equipment to elements of permanent construction, including other installed equipment and appliances, shall be sufficient to allow inspection, service, repair or replacement without removing such elements of permanent construction or disabling the function of a required fire-resistance-rated assembly. Fire pump and *automatic sprinkler system* riser rooms shall be provided with doors and unobstructed passageways large enough to allow removal of the largest piece of equipment.

[F] 902.1.1 Access. Automatic sprinkler system risers, fire pumps and controllers shall be provided with ready access. Where located in a fire pump room or automatic sprinkler system riser room, the door shall be permitted to be locked provided that the key is available at all times.

[F] 902.1.2 Marking on access doors. Access doors for automatic sprinkler system riser rooms and fire pump rooms shall be labeled with an approved sign. The lettering shall be in contrasting color to the background. Letters shall have a minimum height of 2 inches (51 mm) with a minimum stroke of 3/8 inch (10 mm).

[F] 902.1.3 Environment. Automatic sprinkler system riser rooms and fire pump rooms shall be maintained at a temperature of not less than 40ºF (4ºC). Heating units shall be permanently installed.

[F] 902.1.4 Lighting. Permanently installed artificial illumination shall be provided in the automatic sprinkler system riser rooms and fire pump rooms.

SECTION 903
AUTOMATIC SPRINKLER SYSTEMS

[F] 903.1 General. *Automatic sprinkler systems* shall comply with this section.

[F] 903.1.1 Alternative protection. Alternative *automatic fire-extinguishing systems* complying with Section 904 shall be permitted instead of automatic sprinkler protection where recognized by the applicable standard and *approved* by the fire code official.

[S][F] 903.2 Where required. Approved *automatic sprinkler systems* in new buildings and structures shall be provided in the locations described in Sections 903.2.1 through 903.2.12.

Exception: Spaces or areas in telecommunications buildings used exclusively for telecommunications equipment, associated electrical power distribution equipment, batteries and standby engines, provided that those spaces or areas are equipped throughout with an *automatic smoke detection system* in accordance with Section 907.2 and are separated from the remainder of the building by not less than 1-hour *fire barriers* constructed in accordance with Section 707 or not less than 2-hour *horizontal assemblies* constructed in accordance with Section 711, or both.

[F] 903.2.1 Group A. An *automatic sprinkler system* shall be provided throughout buildings and portions thereof used as Group A occupancies as provided in this section.

[F] 903.2.1.1 Group A-1. An *automatic sprinkler system* shall be provided throughout stories containing Group A-1 occupancies and throughout all stories from the Group A-1 occupancy to and including the levels of exit discharge serving that occupancy where one of the following conditions exists:

1. The *fire area* exceeds 12,000 square feet (1115 m^2).
2. The *fire area* has an *occupant load* of 300 or more.
3. The *fire area* is located on a floor other than a *level of exit discharge* serving such occupancies.
4. The *fire area* contains a multitheater complex.

[S][F] 903.2.1.2 Group A-2. An *automatic sprinkler system* shall be provided throughout stories containing Group A-2 occupancies and throughout all stories from the Group A-2 occupancy to and including the levels of exit discharge serving that occupancy where one of the following conditions exists:

1. The *fire area* exceeds 5,000 square feet (464 m^2).
2. The *fire area* has an *occupant load* of 100 or more.
3. The *fire area* is located on a floor other than a *level of exit discharge* serving such occupancies.

   Exception: Item 3 does not apply to fire areas that include space located one floor above the level of exit discharge if the occupant load of the upper floor is less than 50.

[S][F] 903.2.1.3 Group A-3. An *automatic sprinkler system* shall be provided throughout stories containing Group A-3 occupancies and throughout all stories from the Group A-3 occupancy to and including the levels of exit discharge serving that occupancy where one of the following conditions exists:

1. The *fire area* exceeds 12,000 square feet (1115 m^2).
2. The *fire area* has an *occupant load* of 300 or more.
3. The *fire area* is located on a floor other than a *level of exit discharge* serving such occupancies.

   Exception: Item 3 does not apply to fire areas that include space located one floor above the level of exit discharge if the occupant load of the upper floor is less than 50.

[F] 903.2.1.4 Group A-4. An *automatic sprinkler system* shall be provided throughout stories containing Group A-4 occupancies and throughout all stories from the Group A-4 occupancy to and including the levels of exit discharge serving that occupancy where one of the following conditions exists:

1. The *fire area* exceeds 12,000 square feet (1115 m^2).
2. The *fire area* has an *occupant load* of 300 or more.
3. The *fire area* is located on a floor other than a *level of exit discharge* serving such occupancies.

[F] 903.2.1.5 Group A-5. An *automatic sprinkler system* shall be provided for all enclosed Group A-5 accessory use areas in excess of 1,000 square feet (93 m^2).

[F] 903.2.1.5.1 Spaces under grandstands or bleachers. Enclosed spaces under grandstands or *bleachers* shall be equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.1 where either of the following exist:

1. The enclosed area is 1,000 square feet (93 m^2) or less and is not constructed in accordance with Section 1029.1.1.1.
2. The enclosed area exceeds 1,000 square feet (93 m^2).

[W][F] 903.2.1.6 Assembly occupancies on roofs. Where an occupied roof has an assembly occupancy with an *occupant load* exceeding 100 for Group A-2 and 300 for other Group A occupancies, ((~~all floors between the occupied roof and the level of exit discharge~~)) the *building* shall be equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.

Exception: Open parking garages of Type I or Type II construction.

903.2.1.7 Multiple fire areas. An *automatic sprinkler system* shall be provided where multiple fire areas of Group A-1, A-2, A-3 or A-4 occupancies share exit or exit access components and the combined *occupant load* of theses fire areas is 300 or more.

[W] 903.2.1.8 Nightclubs. An *automatic sprinkler system* shall be provided throughout *nightclubs.*

[F] 903.2.2 Ambulatory care facilities. An *automatic sprinkler system* shall be installed throughout the entire floor containing an *ambulatory care facility* where either of the following conditions exist at any time:

1. Four or more care recipients are incapable of self-preservation.
2. One or more care recipients that are incapable of self-preservation are located at other than the level of exit discharge serving such a facility.

In buildings where ambulatory care is provided on levels other than the *level of exit discharge*, an *automatic sprinkler system* shall be installed throughout the entire floor as well as all floors below where such care is provided, and all floors between the level of ambulatory care and the nearest *level of exit discharge*, the level of exit discharge, and all floors below the level of *exit discharge*.

Exception: Floors classified as an open parking garage are not required to be sprinklered.

[W][S][F] 903.2.3 Group E. An *automatic sprinkler system* shall be provided for fire areas containing Group E ((~~occupancies as follows:~~)) where the fire area has an occupant load of 51 or more, calculated in accordance with Table 1004.5.

((~~1. Throughout all Group E *fire areas* greater than 12,000 square feet (1115 m²) in area.~~

~~2. The Group E fire area is located on a floor other than a level of exit discharge serving such occupancies.~~

~~**Exception:** In buildings where every classroom has not fewer than one exterior exit door at ground level, an *automatic sprinkler system* is not required in any area below the lowest level of exit discharge serving that area.~~

~~3. The Group E fire area has an occupant load of 300 or more.~~))

Exceptions:

1. *Portable school classrooms* with an occupant load of 50 or less calculated in accordance with Table 1004.5, provided that the aggregate area of any cluster of *portable school classrooms* does not exceed 6,000 square feet (557 m^2); and clusters of *portable school classrooms* shall be separated as required in Chapter 5.
2. *Portable school classrooms* with an occupant load from 51 through 98, calculated in accordance with Table 1004.5, and provided with two means of direct independent exterior egress from each classroom in accordance with Chapter 10, and one exit from each classroom shall be accessible, provided that the aggregate area of any cluster of portable classrooms does not exceed 6,000 square feet (557 m^2), and clusters of *portable school classrooms* shall be separated as required by Chapter 5.
3. Fire areas containing day care and preschool facilities with a total occupant load of 100 or less located at the level of exit discharge where every room in which care is provided has not fewer than one exit discharge door.

[F] 903.2.4 Group F-1. An *automatic sprinkler system* shall be provided throughout all buildings containing a Group F-1 occupancy where one of the following conditions exists:

1. A Group F-1 *fire area* exceeds 12,000 square feet (1115 m^2).
2. A Group F-1 *fire area* is located more than three stories above *grade plane*.
3. The combined area of all Group F-1 *fire areas* on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m^2).
4. A Group F-1 occupancy used for the manufacture of upholstered furniture or mattresses exceeds 2,500 square feet (232 m^2).

[F] 903.2.4.1 Woodworking operations. An *automatic sprinkler system* shall be provided throughout all Group F-1 occupancy *fire areas* that contain woodworking operations in excess of 2,500 square feet (232 m^2) in area that generate finely divided combustible waste or use finely divided combustible materials.

[F] 903.2.5 Group H. *Automatic sprinkler systems* shall be provided in high-hazard occupancies as required in Sections 903.2.5.1 through 903.2.5.3.

[F] 903.2.5.1 General. An *automatic sprinkler system* shall be installed in Group H occupancies.

[F] 903.2.5.2 Group H-5 occupancies. An *automatic sprinkler system* shall be installed throughout buildings containing Group H-5 occupancies. The design of the sprinkler system shall be not less than that required by this code for the occupancy hazard classifications in accordance with Table 903.2.5.2.

Where the design area of the sprinkler system consists of a *corridor* protected by one row of sprinklers, the maximum number of sprinklers required to be calculated is 13.

[F] 903.2.5.3 Pyroxylin plastics. An *automatic sprinkler system* shall be provided in buildings, or portions thereof, where cellulose nitrate film or pyroxylin plastics are manufactured, stored or handled in quantities exceeding 100 pounds (45 kg).

[F] TABLE 903.2.5.2
GROUP H-5 SPRINKLER DESIGN CRITERIA

LOCATION	OCCUPANCY HAZARD CLASSIFICATION
Fabrication areas	Ordinary Hazard Group 2
Service corridors	Ordinary Hazard Group 2
Storage rooms without dispensing	Ordinary Hazard Group 2
Storage rooms with dispensing	Extra Hazard Group 2
Corridors	Ordinary Hazard Group 2

[W][S][F] 903.2.6 Group I. An *automatic sprinkler system* in accordance with Section 903.3.1.1 shall be provided throughout buildings with a Group I *fire area*.

Exceptions:

1. An *automatic sprinkler system* installed in accordance with Section 903.3.1.2 shall be permitted in Group I-1, Condition 1 facilities.

((~~2. An *automatic sprinkler system* is not required where Group I-4 day care facilities are at the *level of exit discharge* and where every room where care is provided has not fewer than one exterior exit door.~~

~~3. In buildings where Group I-4 day care is provided on levels other than the *level of exit discharge*, an *automatic sprinkler system* in accordance with Section 903.3.1.1 shall be installed on the entire floor where care is provided, all floors between the level of care and the *level of exit discharge*, and all floors below the *level of exit discharge* other than areas classified as an open parking garage.~~))

2. Where new construction houses less than sixteen persons receiving care, an automatic sprinkler system installed in accordance with 903.3.1.2 shall be permitted for Group I-1, Condition 2, assisted living facilities licensed under chapter 388-78A WAC and residential treatment facilities licensed under chapter 246-337 WAC.

3. An automatic sprinkler system installed in accordance with Section 903.3.1.2 shall be permitted in additions to existing buildings where both of the following situations are true:

   3.1. The addition is made to a building previously approved as Group LC or Group R-2 that houses either an assisted living facility licensed under chapter 388-78A WAC or residential treatment facility licensed under chapter 246-337 WAC.

   3.2. The addition contains spaces for 16 or fewer persons receiving care.

[W][S] 903.2.6.1 Group I-4. An automatic sprinkler system shall be provided in fire areas containing Group I-4 occupancies where the fire area has an occupant load of 51 or more, calculated in accordance with Table 1004.5.

Exception: An automatic sprinkler system is not required for Group I-4 day care facilities with a total occupant load of 100 or less, and located at the level of exit discharge and where every room where care is provided has not fewer than one exterior exit door.

903.2.6.1.1 Group I-4 daycare located other than level of discharge. In buildings where Group I-4 day care is provided on levels other than the level of exit discharge, an automatic sprinkler system in accordance with Section 903.3.1.1 shall be installed on the entire floor where care is provided, including the level of exit discharge, and all floors between the level of care and the level of exit discharge and all floors below the level of exit discharge other than areas classified as an open parking garage.

[S][F] 903.2.7 Group M. An *automatic sprinkler system* shall be provided throughout buildings containing a Group M occupancy where one of the following conditions exists:

1. A Group M *fire area* exceeds 12,000 square feet (1115 m^2).
2. A Group M *fire area* is located more than three stories above *grade plane*.
3. The combined area of all Group M *fire areas* on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m^2).
4. A Group M occupancy where the area used for the display and sale of upholstered furniture or mattresses exceeds 5,000 square feet (464 m^2).

[F] 903.2.7.1 High-piled storage. An *automatic sprinkler system* shall be provided in accordance with the *International Fire Code* in all buildings of Group M where storage of merchandise is in high-piled or rack storage arrays.

[W][F] 903.2.8 Group R. An *automatic sprinkler system* installed in accordance with Section 903.3 shall be provided throughout all buildings with a Group R *fire area*.

Exception: Group R-1 if all of the following conditions apply:

1. The Group R *fire area* is no more than 500 square feet and is used for recreational use only.
2. The Group R fire area is on only one *story*.
3. The Group R fire area does not include a basement.
4. The Group R fire area is no closer than 30 feet from another structure.
5. Cooking is not allowed within the Group R fire area.
6. The Group R fire area has an occupant load of no more than 8.
7. A hand-held (portable) fire extinguisher is in every Group R fire area.

[S][F] 903.2.8.1 Group R-3. An *automatic sprinkler system* installed in accordance with Section 903.3.1.3 shall be permitted in Group R-3 occupancies.

((~~**[F] 903.2.8.2 Group R-4, Condition 1.** An *automatic sprinkler system* installed in accordance with Section 903.3.1.3 shall be permitted in Group R-4, Condition 1 occupancies.~~

~~**[F] 903.2.8.3 Group R-4, Condition 2.** An *automatic sprinkler system* installed in accordance with Section 903.3.1.2 shall be permitted in Group R-4, Condition 2 occupancies.~~))

[F] ((~~903.2.8.4~~)) 903.2.8.2 Care facilities. An a*utomatic sprinkler system* installed in accordance with Section 903.3.1.3 shall be permitted in care facilities with five or fewer individuals in a single-family dwelling.

[W][S][F] 903.2.9 Group S-1. An *automatic sprinkler system* shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

1. A Group S-1 *fire area* exceeds 12,000 square feet (1115 m^2).
2. A Group S-1 *fire area* is located more than three stories above *grade plane*.
3. The combined area of all Group S-1 *fire areas* on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m^2).
4. A Group S-1 *fire area* used for the storage of commercial motor vehicles where the *fire area* exceeds 5,000 square feet (464 m^2).
5. A Group S-1 occupancy where the area used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m^2).
6. A Group S-1 occupancy used for self-storage where the *fire area* exceeds 2,500 square feet (232 m^2).

   Exception: Self-service storage facilities no greater than one story above grade plane where all storage spaces can be accessed directly from the exterior.

[F] 903.2.9.1 ((~~Repair~~)) Major repair garages. An *automatic sprinkler system* shall be provided throughout all buildings used as *major repair garages* in accordance with Section 406, as shown:

1. Buildings having two or more *stories above grade plane*, including basements, with a *fire area* containing a *major repair garage* exceeding 10,000 square feet (929 m^2).
2. Buildings not more than one *story above grade plane*, with a *fire area* containing a *major repair garage* exceeding 12,000 square feet (1115 m^2).
3. Buildings with *major repair garages* servicing vehicles parked in basements.
4. A Group S-1 *fire area* used for the major repair of commercial motor vehicles where the *fire area* exceeds 5,000 square feet (464 m^2).

[F] 903.2.9.2 Bulk storage of tires. Buildings and structures where the area for the storage of tires exceeds 20,000 cubic feet (566 m^3) shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

[F] 903.2.10 Group S-2 enclosed parking garages. An *automatic sprinkler system* shall be provided throughout buildings classified as enclosed parking garages in accordance with Section 406.6 where either of the following conditions exists:

1. Where the *fire area* of the enclosed parking garage exceeds 12,000 square feet (1115 m^2).
2. Where the enclosed parking garage is located beneath other groups.

   Exception: Enclosed parking garages located beneath Group R-3 occupancies.

[F] 903.2.10.1 Commercial parking garages. An *automatic sprinkler system* shall be provided throughout buildings used for storage of commercial motor vehicles where the *fire area* exceeds 5,000 square feet (464 m^2).

[F] 903.2.11 Specific building areas and hazards. In all occupancies other than Group U, an *automatic sprinkler system* shall be installed for building design or hazards in the locations set forth in Sections 903.2.11.1 through ((~~903.2.11.6~~)) 903.2.11.7.

[F] 903.2.11.1 Stories without openings. An *automatic sprinkler system* shall be installed throughout all *stories*, including basements, of all buildings where the floor area exceeds 1,500 square feet (139.4 m^2) and where the story does not comply with the following criteria for exterior wall openings:

1. Openings below grade that lead directly to ground level by an exterior *stairway* complying with Section 1011 or an outside ramp complying with Section 1012. Openings shall be located in each 50 linear feet (15 240 mm), or fraction thereof, of *exterior wall* in the *story* on not fewer than one side. The required openings shall be distributed such that the lineal distance between adjacent openings does not exceed 50 feet (15 240 mm).
2. Openings entirely above the adjoining ground level totaling not less than 20 square feet (1.86 m^2) in each 50 linear feet (15 240 mm), or fraction thereof, of *exterior wall* in the story on not fewer than one side. The required openings shall be distributed such that the lineal distance between adjacent openings does not exceed 50 feet (15 240 mm). The height of the bottom of the clear opening shall not exceed 44 inches (1118 mm) measured from the floor.

[F] 903.2.11.1.1 Opening dimensions and access. Openings shall have a minimum dimension of not less than 30 inches (762 mm). Access to such openings shall be provided for the fire department from the exterior and shall not be obstructed in a manner such that fire fighting or rescue cannot be accomplished from the exterior.

[F] 903.2.11.1.2 Openings on one side only. Where openings in a *story* are provided on only one side and the opposite wall of such *story* is more than 75 feet (22 860 mm) from such openings, the *story* shall be equipped throughout with an *approved automatic sprinkler system*, or openings shall be provided on not fewer than two sides of the *story*.

[W][F] 903.2.11.1.3 Basements. Where any portion of a *basement* is located more than 75 feet (22 860 mm) from openings required by Section 903.2.11.1, or where new walls, partitions or other similar obstructions are installed that ((~~restrict the application of water from hose streams~~)) increase the exit access travel distance to more than 75 feet, the *basement* shall be equipped throughout with an *approved automatic sprinkler system*.

[F] 903.2.11.2 Rubbish and linen chutes. An *automatic sprinkler system* shall be installed at the top of rubbish and linen chutes and in their terminal rooms. Chutes shall have additional sprinkler heads installed at alternate floors and at the lowest intake. Where a rubbish chute extends through a building more than one floor below the lowest intake, the extension shall have sprinklers installed that are recessed from the drop area of the chute and protected from freezing in accordance with Section 903.3.1.1. Such sprinklers shall be installed at alternate floors, beginning with the second level below the last intake and ending with the floor above the discharge. *Access* to sprinklers in chutes shall be provided for servicing.

[F] 903.2.11.3 Buildings 55 feet or more in height. An *automatic sprinkler system* shall be installed throughout buildings that have one or more stories with an *occupant load* of 30 or more located 55 feet (16 764 mm) or more above the lowest level of fire department vehicle access, measured to the finished floor.

Exceptions:

1. Open parking structures.
2. Occupancies in Group F-2.

[F] 903.2.11.4 Ducts conveying hazardous exhausts. Where required by the *International Mechanical Code*, automatic sprinklers shall be provided in ducts conveying hazardous exhaust or flammable or combustible materials.

Exception: Ducts where the largest cross-sectional diameter of the duct is less than 10 inches (254 mm).

[F] 903.2.11.5 Commercial cooking operations. An *automatic sprinkler system* shall be installed in commercial kitchen exhaust hood and duct systems where an *automatic sprinkler system* is used to comply with Section 904.

[S][F] 903.2.11.6 Other required ((~~suppression~~)) fire protection systems. In addition to the requirements of Section 903.2, the provisions indicated in Table 903.2.11.6 require the installation of a fire suppression system for certain buildings and areas.

[S][F] TABLE 903.2.11.6
ADDITIONAL REQUIRED ((~~SUPPRESSION~~)) FIRE PROTECTION SYSTEMS

SECTION	SUBJECT
402.5, 402.6.2	Covered and open mall buildings
403.3	High-rise buildings
404.3	Atriums
405.3	Underground structures
407.7	Group I-2
410.6	Stages
411.3	Special amusement buildings
412.2.4	Airport traffic control towers
412.3.6, 412.3.6.1, 412.5.6	Aircraft hangars
415.11.11	Group H-5 HPM exhaust ducts
416.5	Flammable finishes
417.4	Drying rooms
419.5	*Live/work units*
424.3	Children's play structures
428	Buildings containing laboratory suites
507	Unlimited area buildings
509.4	Incidental uses
1029.6.2.3	Smoke-protected assembly seating
IFC	Sprinkler system requirements as set forth in Section 903.2.11.6 of the *International Fire Code*

[W] 903.2.11.7 Relocatable buildings within buildings. Relocatable buildings or structures located within a building with an *approved* fire sprinkler system shall be provided with fire sprinkler protection within the occupiable space of the building and the space underneath the relocatable building.

Exceptions:

1. Sprinkler protection is not required underneath the building when the space is separated from the adjacent space by construction resisting the passage of smoke and heat and combustible storage will not be located there.
2. If the building or structure does not have a roof or ceiling obstructing the overhead sprinklers.
3. Construction trailers and temporary offices used during new building construction prior to occupancy.
4. Movable shopping mall kiosks with a roof or canopy dimension of less than 4 feet on the smallest side.

[F] 903.2.12 During construction. *Automatic sprinkler systems* required during construction, *alteration* and demolition operations shall be provided in accordance with Chapter 33 of the *International Fire Code*.

[F] 903.3 Installation requirements. *Automatic sprinkler systems* shall be designed and installed in accordance with Sections 903.3.1 through 903.3.8.

[S][F] 903.3.1 Standards. Sprinkler systems shall be designed and installed in accordance with Section 903.3.1.1 and rules promulgated by the building or *fire code official* unless otherwise permitted by Sections 903.3.1.2 and 903.3.1.3 and other chapters of this code, as applicable.

[F] 903.3.1.1 NFPA 13 sprinkler systems. Where the provisions of this code require that a building or portion thereof be equipped throughout with an *automatic sprinkler system* in accordance with this section, sprinklers shall be installed throughout in accordance with NFPA 13 except as provided in Sections 903.3.1.1.1 and ((~~903.3.1.1.2~~)) 903.3.1.1.3.

[F] 903.3.1.1.1 Exempt locations. Automatic sprinklers shall not be required in the following rooms or areas where such rooms or areas are protected with an *approved* automatic fire detection system in accordance with Section 907.2 that will respond to visible or invisible particles of combustion. Sprinklers shall not be omitted from a room merely because it is damp, of fire-resistance-rated construction or contains electrical equipment.

1. A room where the application of water, or flame and water, constitutes a serious life or fire hazard, when approved by the *fire code official*.
2. A room or space where sprinklers are considered undesirable because of the nature of the contents, where *approved* by the fire code official.
3. ((~~Generator and transformer rooms~~)) Transformer vaults separated from the remainder of the building by walls and floor/ceiling or roof/ceiling assemblies having a *fire-resistance rating* of not less than ((~~2~~)) 3 hours.
4. Rooms or areas that are of noncombustible construction with wholly noncombustible contents.

((~~5. Fire service access elevator machine rooms and machinery spaces.~~

~~6~~)) 5. Machine rooms, machinery spaces, control rooms and control spaces ((~~associated with occupant evacuation elevators designed in accordance with Section 3008~~)) in accordance with rules promulgated by the building and *fire code official*.

[F] 903.3.1.1.2 Bathrooms. In Group R occupancies sprinklers shall not be required in bathrooms that do not exceed 55 square feet (5 m^2) in area and are located within individual *dwelling units* or *sleeping units*, provided that walls and ceilings, including the walls and ceilings behind a shower enclosure or tub, are of noncombustible or limited-combustible materials with a 15-minute thermal barrier rating.

[S] 903.3.1.1.3 High-rise building sprinkler system design. High-rise building sprinkler systems shall be combination standpipe/sprinkler systems incorporating the following features:

1. Each floor sprinkler system shall be connected between standpipe risers.
2. Shut-off valves, water-flow devices and check valves (or pressure reducing valves) shall be provided on each floor at the sprinkler system connection to each standpipe.
3. Two four-way fire department connections serving the combination system shall be provided on separate streets well separated from each other.
4. At least one of the fire department connections shall be connected to the riser above a riser isolation valve.
5. When a mid-level fire pump is required to meet pressure requirements, two pumps with the same rating shall be installed.
6. Dry-pipe sprinkler systems serving parking garages may use separate two-way fire department connection. The dry-pipe sprinkler system shall be supplied by the on-site water tank.

7. The standpipe risers in each required stair shall be a minimum pipe size of 6 inches (152 mm).
8. Two 2-1/2-inch (64 mm) hose connections shall be provided on every floor level landing in every required stairway. If pressure reducing valves (PRV) are required, each hose connection shall be provided with its own PRV.
9. The system shall be designed to provide a minimum flow of 300 gpm (19 L/s) at a minimum pressure of 150 psi (1034 kPa) [maximum 205 psi (1379 kPa)] at each standpipe connection in addition to the flow and pressure requirements contained in NFPA 14.

[F] 903.3.1.2 NFPA 13R sprinkler systems. *Automatic sprinkler systems* in Group R occupancies up to and including four stories in height in buildings not exceeding 60 feet (18 288 mm) in height above grade plane shall be permitted to be installed throughout in accordance with NFPA 13R.

The number of stories of Group R occupancies constructed in accordance with Sections 510.2 and 510.4 shall be measured from the horizontal assembly creating separate buildings.

[S][F] 903.3.1.2.1 Balconies and decks. Sprinkler protection shall be provided for exterior balconies, decks and ground floor patios of *dwelling units* and *sleeping units* in accordance with rules promulgated by the *building official* or *fire code official.* ((~~where~~)) Where either of the following conditions exists:

1. The building is of Type V construction, provided that there is a roof or deck above.
2. Exterior balconies, decks and ground floor patios of dwelling units and sleeping units are constructed in accordance with Section 705.2.3.1, Exception 3.

Sidewall sprinklers that are used to protect such areas shall be permitted to be located such that their deflectors are within 1 inch (25 mm) to 6 inches (152 mm) below the structural members and a maximum distance of 14 inches (356 mm) below the deck of the exterior balconies and decks that are constructed of open wood joist construction.

[F] 903.3.1.2.2 Open-ended corridors. Sprinkler protection shall be provided in *open-ended corridors* and associated *exterior stairways* and *ramps* as specified in Section 1027.6, Exception 3.

[F] 903.3.1.2.3 Attics. Attic protection shall be provided as follows:

1. Attics that are used or intended for living purposes or storage shall be protected by an *automatic sprinkler system*.
2. Where fuel-fired equipment is installed in an unsprinklered attic, not fewer than one quick-response intermediate temperature sprinkler shall be installed above the equipment.
3. Where located in a building of Type III, Type IV or Type V construction designed in accordance with Section 510.2 or 510.4, attics not required by Item 1 to have sprinklers shall comply with one of the following if the roof assembly is located more than 55 feet (16 764 mm) above the lowest level of required fire department vehicle access:
   3.1. Provide *automatic sprinkler system* protection.
   3.2. Construct the attic using noncombust-ible materials.
   3.3. Construct the attic using fire-retardant-treated wood complying with Section 2303.2.
   3.4. Fill the attic with noncombustible insulation.

   The height of the roof assembly shall be determined by measuring the distance from the lowest required fire vehicle access road surface adjacent to the building to the eave of the highest pitched roof, the intersection of the highest roof to the exterior wall, or the top of the highest parapet, whichever yields the greatest distance. For the purpose of this measurement, required fire vehicle access roads shall include only those roads that are necessary for compliance with Section 503 of the *International Fire Code*.
4. Group R-4, Condition 2 occupancy attics not required by Item 1 to have sprinklers shall comply with one of the following:
   4.1. Provide *automatic sprinkler system* protection.
   4.2. Provide a heat detection system throughout the attic that is arranged to activate the building fire alarm system.
   4.3. Construct the attic using noncombust-ible materials.
   4.4. Construct the attic using fire-retardant-treated wood complying with Section 2303.2.
   4.5. Fill the attic with noncombustible insulation.

[S][F] 903.3.1.3 NFPA 13D sprinkler systems. *Automatic sprinkler systems* installed in one- and two-family *dwellings*; Group R-3; ((~~Group R-4, Condition 1;~~)) and *townhouses*, when approved by the *fire code official*, shall be permitted to be installed throughout in accordance with NFPA 13D.

[F] 903.3.2 Quick-response and residential sprinklers. Where *automatic sprinkler systems* are required by this code, quick-response or residential automatic sprinklers shall be installed in all of the following areas in accordance with Section 903.3.1 and their listings:

1. Throughout all spaces within a smoke compartment containing care recipient *sleeping units* in Group I-2 in accordance with this code.
2. Throughout all spaces within a smoke compartment containing treatment rooms in ambulatory care facilities.
3. *Dwelling units* and *sleeping units* in Group I-1 and R occupancies.
4. Light-hazard occupancies as defined in NFPA 13.

[S][F] 903.3.3 Obstructed locations. Automatic sprinklers shall be installed ((~~with regard to obstructions that will delay activation or obstruct the water distribution pattern~~)) in accordance with NFPA 13 obstruction criteria and the listing requirements of the sprinkler and shall be in accordance with the applicable *automatic sprinkler system* standard that is being used. Automatic sprinklers shall be installed in or under covered kiosks, displays, booths, concession stands, or equipment that exceeds 4 feet (1219 mm) in width and depth. Not less than a 3-foot (914 mm) clearance shall be maintained between automatic sprinklers and the top of piles of combustible fibers.

Exception: Kitchen equipment under exhaust hoods protected with a fire-extinguishing system in accordance with Section 904.

[F] 903.3.4 Actuation. *Automatic sprinkler systems* shall be automatically actuated unless specifically provided for in this code.

[S][F] 903.3.5 Water supplies. Water supplies for *automatic sprinkler systems* shall comply with this section and the standards referenced in Section 903.3.1. The potable water supply shall be protected against backflow in accordance with the requirements of this section and the ((~~*International*~~)) *Uniform Plumbing Code*. For connections to public waterworks systems, the water supply test data provided by Seattle Public Utilities and used for design of fire protection systems shall be adjusted ((~~to account for seasonal and daily pressure fluctuations based on information from the water supply authority and as approved by the fire code official~~)) in accordance with rules promulgated by the *fire code official*.

[S][F] 903.3.5.1 Domestic services. ((~~Where the domestic service provides the water supply for the *automatic sprinkler system*, the supply shall be~~)) Both NFPA 13R and NFPA 13D sprinkler systems can be supplied by a domestic service in accordance with this section.

[S][F] 903.3.5.2 ((~~Residential combination~~)) Combined fire/domestic services. A single combination water supply shall be allowed for all types of sprinkler systems provided that, when required by the applicable sprinkler standard, the domestic demand is added to the sprinkler demand ((~~as required by~~)) in accordance with the domestic demand tables in NFPA 13R.

[W][S] 903.3.5.3 Underground portions of fire protection system water supply piping. The installation or modification of an underground water main, public or private, supplying a water-based fire protection system shall be in accordance with NFPA 24 and RCW 18.160. Piping and appurtenances downstream of the first control valve on the lateral or service line from the distribution main to one foot above finished floor shall be approved by the *fire code official*. Such underground piping shall be installed by a fire sprinkler contractor licensed in accordance with chapter 18.160 RCW and holding either a Level U or a Level 3 license. For underground piping supplying systems installed in accordance with Section 903.3.1.2, a Level 2, 3, or U licensed contractor is acceptable.

Exceptions: Portions of underground piping that are combined fire/domestic services, or are supplying *automatic sprinkler systems* installed in accordance with NFPA 13D.

[S] 903.3.5.4 Fire service. A fire service shall be allowed for all types of sprinkler piping.

[F] 903.3.6 Hose threads. Fire hose threads and fittings used in connection with *automatic sprinkler systems* shall be as prescribed by the fire code official.

[F] 903.3.7 Fire department connections. Fire department connections for *automatic sprinkler systems* shall be installed in accordance with Section 912.

[F] 903.3.8 Limited area sprinkler systems. Limited area sprinkler systems shall be in accordance with the standards listed in Section 903.3.1 except as provided in Sections 903.3.8.1 through 903.3.8.5.

903.3.8.1 Number of sprinklers. Limited area sprinkler systems shall not exceed six sprinklers in any single *fire area*.

903.3.8.2 Occupancy hazard classification. Only areas classified by NFPA 13 as Light Hazard or Ordinary Hazard Group 1 shall be permitted to be protected by limited area sprinkler systems.

903.3.8.3 Piping arrangement. Where a limited area sprinkler system is installed in a building with an automatic wet standpipe system, sprinklers shall be supplied by the standpipe system. Where a limited area sprinkler system is installed in a building without an automatic wet standpipe system, water shall be permitted to be supplied by the plumbing system provided that the plumbing system is capable of simultaneously supplying domestic and sprinkler demands.

903.3.8.4 Supervision. Control valves shall not be installed between the water supply and sprinklers unless the valves are of an *approved* indicating type that are supervised or secured in the open position.

903.3.8.5 Calculations. Hydraulic calculations in accordance with NFPA 13 shall be provided to demonstrate that the available water flow and pressure are adequate to supply all sprinklers installed in any single *fire area* with discharge densities corresponding to the hazard classification.

[S][F] 903.4 Sprinkler system supervision and alarms. Valves controlling the water supply for *automatic sprinkler systems*, pumps, tanks, water levels and temperatures, critical air pressures and waterflow switches on all sprinkler systems shall be electrically supervised by a *listed* fire alarm control unit.

Exceptions:

1. *Automatic sprinkler systems* protecting one- and two-family *dwellings* and *townhouses* if approved by the *fire code official*.
2. Limited area sprinkler systems in accordance with Section 903.3.8.
3. *Automatic sprinkler systems* installed in accordance with NFPA 13R where a common supply main is used to supply both domestic water and the *automatic sprinkler system*, and a separate shutoff valve for the *automatic sprinkler system* is not provided.
4. Jockey pump control valves that are sealed or locked in the open position.
5. Control valves to commercial kitchen hoods, paint spray booths or dip tanks that are sealed or locked in the open position.
6. Valves controlling the fuel supply to fire pump engines that are sealed or locked in the open position.
7. Trim valves to pressure switches in dry, preaction and deluge sprinkler systems that are sealed or locked in the open position.

[F] 903.4.1 Monitoring. Alarm, supervisory and trouble signals shall be distinctly different and shall be automatically transmitted to an *approved* supervising station or, where *approved* by the fire code official, shall sound an audible signal at a *constantly attended location*.

Exceptions:

1. ((~~Underground key or hub valves in roadway boxes~~)) Valves provided by the municipality or public utility are not required to be monitored.
2. Backflow prevention device test valves located in limited area sprinkler system supply piping shall be locked in the open position. In occupancies required to be equipped with a fire alarm system, the backflow preventer valves shall be electrically supervised by a tamper switch installed in accordance with NFPA 72 and separately annunciated.

[F] 903.4.2 Alarms. An approved audible device, located on the exterior of the building in an approved location, shall be connected to each *automatic sprinkler system*. Such sprinkler waterflow alarm devices shall be activated by water flow equivalent to the flow of a single sprinkler of the smallest orifice size installed in the system. Where a fire alarm system is installed, actuation of the *automatic sprinkler system* shall actuate the building fire alarm system.

[F] 903.4.3 Floor control valves. *Approved* supervised indicating control valves shall be provided at the point of connection to the riser on each floor in high-rise buildings.

[F] 903.5 Testing and maintenance. Sprinkler systems shall be tested and maintained in accordance with the *International Fire Code*.

SECTION 904
ALTERNATIVE AUTOMATIC FIRE-EXTINGUISHING SYSTEMS

[F] 904.1 General. Automatic fire-extinguishing systems, other than *automatic sprinkler systems*, shall be designed, installed, inspected, tested and maintained in accordance with the provisions of this section and the applicable referenced standards.

[F] 904.2 Where permitted. Automatic fire-extinguishing systems installed as an alternative to the required *automatic sprinkler systems* of Section 903 shall be *approved* by the fire code official.

[F] 904.2.1 Restriction on using automatic sprinkler system exceptions or reductions. Automatic fire-extinguishing systems shall not be considered alternatives for the purposes of exceptions or reductions allowed for *automatic sprinkler systems* or by other requirements of this code.

[F] 904.2.2 Commercial hood and duct systems. Each required commercial kitchen exhaust hood and duct system required by Section 609 of the *International Fire Code* or Chapter 5 of the *International Mechanical Code* to have a Type I hood shall be protected with an approved automatic fire-extinguishing system installed in accordance with this code.

[S][F] 904.3 Installation. Automatic fire-extinguishing systems shall be installed in accordance with this section.

[F] 904.3.1 Electrical wiring. Electrical wiring shall be in accordance with ((~~NFPA 70~~)) the Seattle Electrical Code.

[F] 904.3.2 Actuation. Automatic fire-extinguishing systems shall be automatically actuated and provided with a manual means of actuation in accordance with Section 904.11.1. Where more than one hazard could be simultaneously involved in fire due to their proximity, all hazards shall be protected by a single system designed to protect all hazards that could become involved.

Exception: Multiple systems shall be permitted to be installed if they are designed to operate simultaneously.

[F] 904.3.3 System interlocking. Automatic equipment interlocks with fuel shutoffs, ventilation controls, door closers, window shutters, conveyor openings, smoke and heat vents and other features necessary for proper operation of the fire-extinguishing system shall be provided as required by the design and installation standard utilized for the hazard.

[F] 904.3.4 Alarms and warning signs. Where alarms are required to indicate the operation of automatic fire-extinguishing systems, distinctive audible and visible alarms and warning signs shall be provided to warn of pending agent discharge. Where exposure to automatic-extinguishing agents poses a hazard to persons and a delay is required to ensure the evacuation of occupants before agent discharge, a separate warning signal shall be provided to alert occupants once agent discharge has begun. Audible signals shall be in accordance with Section 907.5.2.

[F] 904.3.5 Monitoring. Where a building fire alarm system is installed, automatic fire-extinguishing systems shall be monitored by the building fire alarm system in accordance with NFPA 72.

[F] 904.4 Inspection and testing. Automatic fire-extinguishing systems shall be inspected and tested in accordance with the provisions of this section prior to acceptance.

[F] 904.4.1 Inspection. Prior to conducting final acceptance tests, all of the following items shall be inspected:

1. Hazard specification for consistency with design hazard.
2. Type, location and spacing of automatic- and manual-initiating devices.
3. Size, placement and position of nozzles or discharge orifices.
4. Location and identification of audible and visible alarm devices.
5. Identification of devices with proper designations.
6. Operating instructions.

[F] 904.4.2 Alarm testing. Notification appliances, connections to fire alarm systems and connections to *approved* supervising stations shall be tested in accordance with this section and Section 907 to verify proper operation.

[F] 904.4.2.1 Audible and visible signals. The audibility and visibility of notification appliances signaling agent discharge or system operation, where required, shall be verified.

[F] 904.4.3 Monitor testing. Connections to protected premises and supervising station fire alarm systems shall be tested to verify proper identification and retransmission of alarms from automatic fire-extinguishing systems.

[F] 904.5 Wet-chemical systems. Wet-chemical extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with NFPA 17A and their listing. Records of inspections and testing shall be maintained.

[F] 904.6 Dry-chemical systems. Dry-chemical extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with NFPA 17 and their listing. Records of inspections and testing shall be maintained.

[F] 904.7 Foam systems. Foam-extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with NFPA 11 and NFPA 16 and their listing. Records of inspections and testing shall be maintained.

[F] 904.8 Carbon dioxide systems. Carbon dioxide extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with NFPA 12 and their listing. Records of inspections and testing shall be maintained.

[F] 904.9 Halon systems. Halogenated extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with NFPA 12A and their listing. Records of inspections and testing shall be maintained.

[F] 904.10 Clean-agent systems. Clean-agent fire-extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with NFPA 2001 and their listing. Records of inspections and testing shall be maintained.

[F] 904.11 Automatic water mist systems. *Automatic water mist systems* shall be permitted in applications that are consistent with the applicable listing or approvals and shall comply with Sections 904.11.1 through 904.11.3.

[F] 904.11.1 Design and installation requirements. *Automatic water mist systems* shall be designed and installed in accordance with Sections 904.11.1.1 through 904.11.1.4.

[F] 904.11.1.1 General. *Automatic water mist systems* shall be designed and installed in accordance with NFPA 750 and the manufacturer's instructions.

[F] 904.11.1.2 Actuation. *Automatic water mist systems* shall be automatically actuated.

[F] 904.11.1.3 Water supply protection. Connections to a potable water supply shall be protected against backflow in accordance with the *International Plumbing Code*.

[F] 904.11.1.4 Secondary water supply. Where a secondary water supply is required for an *automatic sprinkler system*, an *automatic water mist system* shall be provided with an *approved* secondary water supply.

[F] 904.11.2 Water mist system supervision and alarms. Supervision and alarms shall be provided as required for *automatic sprinkler systems* in accordance with Section 903.4.

[F] 904.11.2.1 Monitoring. Monitoring shall be provided as required for *automatic sprinkler systems* in accordance with Section 903.4.1.

[F] 904.11.2.2 Alarms. Alarms shall be provided as required for *automatic sprinkler systems* in accordance with Section 903.4.2.

[F] 904.11.2.3 Floor control valves. Floor control valves shall be provided as required for *automatic sprinkler systems* in accordance with Section 903.4.3.

[F] 904.11.3 Testing and maintenance. *Automatic water mist systems* shall be tested and maintained in accordance with the *International Fire Code*.

[S][F] 904.12 Commercial cooking systems. The automatic fire-extinguishing system for commercial cooking systems shall be of a type recognized for protection of commercial cooking equipment and exhaust systems of the type and arrangement protected. Preengineered automatic dry- and wet-chemical extinguishing systems shall be tested in accordance with UL 300 and *listed* and *labeled* for the intended application. Other types of automatic fire-extinguishing systems shall be *listed* and *labeled* for specific use as protection for commercial cooking operations. The system shall be installed in accordance with this code, NFPA 96, its listing and the manufacturer's installation instructions. Signage shall be provided on the exhaust hood or system cabinet, indicating the type and arrangement of cooking appliances protected by the automatic fire extinguishing system. Signage shall indicate appliances from left to right, be durable, and the size, color and lettering shall be approved. Automatic fire-extinguishing systems of the following types shall be installed in accordance with the referenced standard indicated, as follows:

1. Carbon dioxide extinguishing systems, NFPA 12.
2. *Automatic sprinkler systems*, NFPA 13.
3. Automatic water mist systems, NFPA 750.
4. Foam-water sprinkler system or foam-water spray systems, NFPA 16.
5. Dry-chemical extinguishing systems, NFPA 17.
6. Wet-chemical extinguishing systems, NFPA 17A.

Exception: Factory-built commercial cooking recirculating systems that are tested in accordance with UL 710B and *listed*, *labeled* and installed in accordance with Section 304.1 of the *International Mechanical Code*.

[F] 904.12.1 Manual system operation. A manual actuation device shall be located at or near a *means of egress* from the cooking area not less than 10 feet (3048 mm) and not more than 20 feet (6096 mm) from the kitchen exhaust system. The manual actuation device shall be installed not more than 48 inches (1200 mm) or less than 42 inches (1067 mm) above the floor and shall clearly identify the hazard protected. The manual actuation shall require a maximum force of 40 pounds (178 N) and a maximum movement of 14 inches (356 mm) to actuate the fire suppression system.

Exception: *Automatic sprinkler systems* shall not be required to be equipped with manual actuation means.

[F] 904.12.2 System interconnection. The actuation of the fire suppression system shall automatically shut down the fuel or electrical power supply to the cooking equipment. The fuel and electrical supply reset shall be manual.

[F] 904.12.3 Carbon dioxide systems. Where carbon dioxide systems are used, there shall be a nozzle at the top of the ventilating duct. Additional nozzles that are symmetrically arranged to give uniform distribution shall be installed within vertical ducts exceeding 20 feet (6096 mm) and horizontal ducts exceeding 50 feet (15 240 mm). *Dampers* shall be installed at either the top or the bottom of the duct and shall be arranged to operate automatically upon activation of the fire-extinguishing system. Where the *damper* is installed at the top of the duct, the top nozzle shall be immediately below the *damper*. Automatic carbon dioxide fire-extinguishing systems shall be sufficiently sized to protect against all hazards venting through a common duct simultaneously.

[F] 904.12.3.1 Ventilation system. Commercial-type cooking equipment protected by an automatic carbon dioxide-extinguishing system shall be arranged to shut off the ventilation system upon activation.

[F] 904.12.4 Special provisions for automatic sprinkler systems. *Automatic sprinkler systems* protecting commercial-type cooking equipment shall be supplied from a separate, indicating-type control valve that is identified. Access to the control valve shall be provided.

[F] 904.12.4.1 Listed sprinklers. Sprinklers used for the protection of fryers shall be tested in accordance with UL 199E, *listed* for that application and installed in accordance with their listing. *

[F] 904.13 Domestic cooking systems. Cooktops and ranges installed in the following occupancies shall be protected in accordance with Section 904.13.1:

1. In Group I-1 occupancies where domestic cooking facilities are installed in accordance with Section 420.8.
2. In Group I-2, Condition 1 occupancies where domestic cooking facilities are installed in accordance with Section 407.2.6.
3. In Group R-2 college dormitories where domestic cooking facilities are installed in accordance with Section 420.10.

[F] 904.13.1 Protection from fire. Cooktops and ranges shall be protected in accordance with Section 904.13.1.1 or 904.13.1.2.

[F] 904.13.1.1 Automatic fire-extinguishing system. The domestic recirculating or exterior vented cooking hood provided over the cooktop or range shall be equipped with an approved automatic fire-extinguishing system complying with the following:

1. The automatic fire-extinguishing system shall be of a type recognized for protection of domestic cooking equipment. Preengineered automatic fire-extinguishing systems shall be listed and labeled in accordance with UL 300A and installed in accordance with the manufacturer's instructions.
2. Manual actuation of the fire-extinguishing system shall be provided in accordance with Section 904.12.1.
3. Interconnection of the fuel and electric power supply shall be in accordance with Section 904.12.2.

[F] 904.13.1.2 Ignition prevention. Cooktops and ranges shall include burners that have been tested and listed to prevent ignition of cooking oil with burners turned on to their maximum heat settings and allowed to operate for 30 minutes.

[F] 904.14 Aerosol fire-extinguishing systems. Aerosol fire-extinguishing systems shall be installed, periodically inspected, tested and maintained in accordance with Sections 901 and 904.4, NFPA 2010, and in accordance with their listing.

Such devices and appurtenances shall be listed and installed in compliance with manufacturer's instructions.

SECTION 905
STANDPIPE SYSTEMS

[F] 905.1 General. Standpipe systems shall be provided in new buildings and structures in accordance with Sections 905.2 through 905.11. In buildings used for high-piled combustible storage, fire protection shall be in accordance with the *International Fire Code*.

[S][F] 905.2 Installation standard. Standpipe systems shall be installed in accordance with this section, ((~~and~~)) NFPA 14 and rules promulgated by the building or *fire code official*. Fire department connections for standpipe systems shall be in accordance with Section 912.

[S][F] 905.3 Required installations. Standpipe systems shall be installed where required by Sections 905.3.1 through 905.3.8. Standpipe systems are allowed to be combined with *automatic sprinkler systems*.

Exception: Standpipe systems are not required in ((~~Group R-3 occupancies~~)) one- and two-family *dwellings* and townhouses.

[F] 905.3.1 Height. Class III standpipe systems shall be installed throughout buildings where any of the following conditions exist:

1. Four or more stories are above or below grade plane.
2. The floor level of the highest *story* is located more than 30 feet (9144 mm) above the lowest level of fire department vehicle access.
3. The floor level of the lowest *story* is located more than 30 feet (9144 mm) below the highest level of fire department vehicle access.

Exceptions:

1. Class I standpipes are allowed in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.
2. Class I standpipes are allowed in Group B and E occupancies.
3. Class I manual standpipes are allowed in *open parking garages* where the highest floor is located not more than 150 feet (45 720 mm) above the lowest level of fire department vehicle access.
4. Class I manual dry standpipes are allowed in *open parking garages* that are subject to freezing temperatures, provided that the hose connections are located as required for Class II standpipes in accordance with Section 905.5.
5. Class I standpipes are allowed in basements equipped throughout with an *automatic sprinkler system*.
6. Class I standpipes are allowed in buildings where occupant-use hose lines will not be utilized by trained personnel or the fire department.

7. In determining the lowest level of fire department vehicle access, it shall not be required to consider either of the following:
   7.1. Recessed loading docks for four vehicles or less.
   7.2. Conditions where topography makes access from the fire department vehicle to the building impractical or impossible.

[F] 905.3.2 Group A. Class I automatic wet standpipes shall be provided in nonsprinklered Group A buildings having an *occupant load* exceeding 1,000 persons.

Exceptions:

1. Open-air-seating spaces without enclosed spaces.
2. Class I automatic dry and semiautomatic dry standpipes or manual wet standpipes are allowed in buildings that are not high-rise buildings.

[S][F] 905.3.3 Covered and open mall buildings. Covered mall and open mall buildings shall be equipped throughout with a Class I standpipe system ((~~where required by Section 905.3.1. Mall buildings not required to be equipped with a standpipe system by Section 905.3.1 shall be equipped with Class I hose connections connected to the *automatic sprinkler system* sized to deliver water at 250 gallons per minute (946.4 L/min) at the hydraulically most remote hose connection while concurrently supplying the automatic sprinkler system demand. The standpipe system shall be designed to not exceed a 50 pounds per square inch (psi) (345 kPa) residual pressure loss with a flow of 250 gallons per minute (946.4 L/min) from the fire department connection to the hydraulically most remote hose connection. Hose~~)) with hose connections ((~~shall be~~)) provided at each of the following locations:

1. Within the mall at the entrance to each *exit* passageway or *corridor*.
2. At each floor-level landing within *interior exit stairways* opening directly on the mall.
3. At exterior public entrances to the mall of a covered mall building.
4. At public entrances at the perimeter line of an open mall building.
5. At other locations as necessary so that the distance to reach all portions of a tenant space does not exceed 200 feet (60 960 mm) from a hose connection.

((~~**[F] 905.3.4 Stages.** Stages greater than 1,000 square feet in area (93 m^2) shall be equipped with a Class III wet standpipe system with 1-1/2-inch and 2-1/2-inch (38 mm and 64 mm) hose connections on each side of the stage.~~

~~**Exception:** Where the building or area is equipped throughout with an *automatic sprinkler system*, a 1-1/2-inch (38 mm) hose connection shall be installed in accordance with NFPA 13 or in accordance with NFPA 14 for Class II or III standpipes.~~

~~**[F] 905.3.4.1 Hose and cabinet.** The 1-1/2-inch (38 mm) hose connections shall be equipped with sufficient lengths of 1-1/2-inch (38 mm) hose to provide fire protection for the stage area. Hose connections shall be equipped with an *approved* adjustable fog nozzle and be mounted in a cabinet or on a rack.~~))

[F] ((~~905.3.5~~)) 905.3.4 Underground buildings. Underground buildings shall be equipped throughout with a Class I automatic wet or manual wet standpipe system.

[F] ((~~905.3.6~~)) 905.3.5 Helistops and heliports. Buildings with a rooftop *helistop* or *heliport* shall be equipped with a Class I or III standpipe system extended to the roof level on which the *helistop* or *heliport* is located in accordance with Section 2007.5 of the *International Fire Code*.

[F] ((~~905.3.7~~)) 905.3.6 Marinas and boatyards. Standpipes in marinas and boatyards shall comply with Chapter 36 of the *International Fire Code*.

[F] ((~~905.3.8~~)) 905.3.7 Rooftop gardens and landscaped roofs. Buildings or structures that have rooftop gardens or landscaped roofs and that are equipped with a standpipe system shall have the standpipe system extended to the roof level on which the rooftop garden or landscaped roof is located.

[S][F] 905.4 Location of Class I standpipe hose connections. Class I standpipe hose connections shall be provided in all of the following locations:

1. In every required *interior exit stairway*, a hose connection shall be provided for each story above and below grade plane. Hose connections shall be located at the main floor landing ((~~unless otherwise *approved* by the fire code official~~)) or the main landing at each *story*, but must be consistent throughout a building.

   Exception: A single hose connection shall be permitted to be installed in the open corridor or open breezeway between open stairs that are not greater than 75 feet (22 860 mm) apart.

2. On each side of the wall adjacent to the *exit* opening of a *horizontal exit*.

Exception: Where floor areas adjacent to a *horizontal exit* are reachable from an *interior exit stairway* hose connection by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the *horizontal exit*.

3. In every *exit* passageway, at the entrance from the *exit* passageway to other areas of a building.

   Exception: Where floor areas adjacent to an *exit* passageway are reachable from an *interior exit stairway* hose connection by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the entrance from the *exit* passageway to other areas of the building.

4. In covered mall buildings, adjacent to each exterior public entrance to the mall and adjacent to each entrance from an exit passageway or exit corridor to the mall. In open mall buildings, adjacent to each public entrance to the mall at the perimeter line and adjacent to each entrance from an exit passageway or exit corridor to the mall.

5. Where the roof has a slope less than four units vertical in 12 units horizontal (33.3-percent slope), a hose connection shall be located to serve the roof or at the highest landing of an *interior exit stairway* with access to the roof provided in accordance with Section 1011.12. Hose connections on a roof shall be at least 10 feet (3048 mm) from the roof edge, skylight, light well or other opening, unless protected by an *approved* 42-inch-high (1067 mm) guard or equivalent.

6. Where the most remote portion of a nonsprinklered floor or *story* is more than 150 feet (45 720 mm) from a hose connection or the most remote portion of a sprinklered floor or *story* or roof is more than 200 feet (60 960 mm) from a hose connection, the fire code official is authorized to require that additional hose connections be provided in *approved* locations. Access to the additional hose connections shall be through protected enclosures. The protected enclosure shall be a corridor constructed as a smoke barrier from the interior exit stairway to the standpipe connection. Additional hose connections in parking garages and roofs are not required to be accessed through or located in protected enclosures.

[F] 905.4.1 Protection. Risers and laterals of Class I standpipe systems not located within an *interior exit stairway* shall be protected by a degree of *fire resistance* equal to that required for vertical enclosures in the building in which they are located.

Exception: In buildings equipped throughout with an *approved automatic sprinkler system*, laterals that are not located within an *interior exit stairway* are not required to be enclosed within fire-resistance-rated construction.

[F] 905.4.2 Interconnection. In buildings where more than one standpipe is provided, the standpipes shall be interconnected in accordance with NFPA 14.

[S][F] 905.5 Location of Class II standpipe hose connections. Class II standpipe hose connections located so that all portions of the building are within 30 feet (9144 mm) of a nozzle attached to 100 feet (30 480 mm) of hose. Class II standpipe hose connections shall be located where they will have *ready access*.

((~~[F] 905.5.1 Groups A-1 and A-2.~~ ~~In Group A-1 and A-2 occupancies having *occupant loads* exceeding 1,000 persons, hose connections shall be located on each side of any stage, on each side of the rear of the auditorium, on each side of the balcony and on each tier of dressing rooms.~~))

[F] ((~~905.5.2~~)) 905.5.1 Protection. Fire-resistance-rated protection of risers and laterals of Class II standpipe systems is not required.

[F] ((~~905.5.3~~)) 905.5.2 Class II system 1-inch hose. A minimum 1-inch (25 mm) hose shall be allowed to be used for hose stations in light-hazard occupancies where investigated and *listed* for this service and where *approved* by the fire code official.

[F] 905.6 Location of Class III standpipe hose connections. Class III standpipe systems shall have hose connections located as required for Class I standpipes in Section 905.4 and shall have Class II hose connections as required in Section 905.5.

[F] 905.6.1 Protection. Risers and laterals of Class III standpipe systems shall be protected as required for Class I systems in accordance with Section 905.4.1.

[F] 905.6.2 Interconnection. In buildings where more than one Class III standpipe is provided, the standpipes shall be interconnected in accordance with NFPA 14.

[F] 905.7 Cabinets. Cabinets containing fire-fighting equipment such as standpipes, fire hoses, fire extinguishers or fire department valves shall not be blocked from use or obscured from view.

[F] 905.7.1 Cabinet equipment identification. Cabinets shall be identified in an *approved* manner by a permanently attached sign with letters not less than 2 inches (51 mm) high in a color that contrasts with the background color, indicating the equipment contained therein.

Exceptions:

1. Doors not large enough to accommodate a written sign shall be marked with a permanently attached pictogram of the equipment contained therein.
2. Doors that have either an *approved* visual identification clear glass panel or a complete glass door panel are not required to be marked.

[F] 905.7.2 Locking cabinet doors. Cabinets shall be unlocked.

Exceptions:

1. Visual identification panels of glass or other *approved* transparent frangible material that is easily broken and allows access.
2. *Approved* locking arrangements.
3. Group I-3 occupancies.

[F] 905.8 Dry standpipes. Dry standpipes shall not be installed.

Exception: Where subject to freezing and in accordance with NFPA 14.

[S][F] 905.9 Valve supervision. Valves controlling water supplies shall be supervised in the open position so that a change in the normal position of the valve will generate a supervisory signal at the supervising station required by Section 903.4. Where a fire alarm system is provided, a signal shall be transmitted to the control unit.

Exceptions:

1. Valves ((~~to underground key or hub valves in roadway boxes~~)) provided by the municipality or public utility do not require supervision.
2. Valves locked in the normal position and inspected as provided in this code in buildings not equipped with a fire alarm system or *approved* supervising station.

[F] 905.10 During construction. Standpipe systems required during construction and demolition operations shall be provided in accordance with Section 3311.

[F] 905.11 Locking standpipe outlet caps. The *fire code official* is authorized to require locking caps on the outlets on dry standpipes where the responding fire department carries key wrenches for the removal that are compatible with locking FDC connection caps.

SECTION 906
PORTABLE FIRE EXTINGUISHERS

[F] 906.1 Where required. Portable fire extinguishers shall be installed in all of the following locations:

1. In Group A, B, E, F, H, I, M, R-1, R-2, R-4 and S occupancies.

   Exceptions:

   1. In Group R-2 occupancies, portable fire extinguishers shall be required only in locations specified in Items 2 through 6 where each *dwelling unit* is provided with a portable fire extinguisher having a minimum rating of 1-A:10-B:C.
   2. In Group E occupancies. portable fire extinguishers shall be required only in locations specified in Items 2 through 6 where each classroom is provided with a portable fire extinguisher having a minimum rating of 2-A:20-B:C.
2. Within 30 feet (9144 mm) distance of travel from commercial cooking equipment and from domestic cooking equipment in Group I-1; I-2, Condition 1; and R-2 college dormitory occupancies.
3. In areas where flammable or *combustible liquids* are stored, used or dispensed.
4. On each floor of structures under construction, except Group R-3 occupancies, in accordance with Section 3315.1 of the *International Fire Code*.
5. Where required by the *International Fire Code* sections indicated in Table 906.1.
6. Special-hazard areas, including but not limited to laboratories, computer rooms and generator rooms, where required by the fire code official.

[F] TABLE 906.1
ADDITIONAL REQUIRED PORTABLE FIRE EXTINGUISHERS IN THE INTERNATIONAL FIRE CODE

IFC SECTION	SUBJECT
303.5	Asphalt kettles
307.5	Open burning
308.1.3	Open flames—torches
309.4	Powered industrial trucks
2005.2	Aircraft towing vehicles

2. In Group I-3 occupancies and in mental health areas in Group I-2 occupancies, access to portable fire extinguishers shall be permitted to be locked or to be located in staff locations provided that the staff has keys.

[F] 906.9 Extinguisher installation. The installation of portable fire extinguishers shall be in accordance with Sections 906.9.1 through 906.9.3.

[F] 906.9.1 Extinguishers weighing 40 pounds or less. Portable fire extinguishers having a gross weight not exceeding 40 pounds (18 kg) shall be installed so that their tops are not more than 5 feet (1524 mm) above the floor.

[F] 906.9.2 Extinguishers weighing more than 40 pounds. Hand-held portable fire extinguishers having a gross weight exceeding 40 pounds (18 kg) shall be installed so that their tops are not more than 3.5 feet (1067 mm) above the floor.

[F] 906.9.3 Floor clearance. The clearance between the floor and the bottom of installed hand-held portable fire extinguishers shall be not less than 4 inches (102 mm).

[F] 906.10 Wheeled units. Wheeled fire extinguishers shall be conspicuously located in a designated location.

SECTION 907
FIRE ALARM AND DETECTION SYSTEMS

[S][F] 907.1 General. This section covers the application, installation, performance and maintenance of fire alarm systems and their components. Buildings required by this section to be provided with a fire alarm system shall be provided with a single fire alarm system. For the purposes of this section, *fire walls* not located on a property line shall not constitute a separate building.

Exception: A single system is not required in *existing buildings* that are being increased in size and the existing fire alarm system is unable to expand into the new space. In those cases multiple systems shall be arranged as described below for non-required fire alarm systems.

Buildings not required by this section to be provided with a fire alarm system may be provided with multiple partial fire alarm systems if:

1. The systems are connected so that all systems simultaneously activate alarm notification appliances upon a signal from any of the fire alarm systems in the building, and
2. The location of each system's annunciator panel (or main panel) is also provided with annunciator panels with reset capability for every other system in the building.

[F] 907.1.1 Construction documents. *Construction documents* for fire alarm systems shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code, the *International Fire Code* and relevant laws, ordinances, rules and regulations, as determined by the fire code official.

[S][F] 907.1.2 Fire alarm shop drawings. All *construction documents* shall be reviewed by a NICET III or IV in fire alarms or a professional engineer licensed in the state of Washington prior to being submitted for permitting. The reviewing professional shall submit a stamped, signed and dated letter; or a verification method approved by the *fire code official* indicating the system has been reviewed and meets or exceeds the design requirements of the State of Washington and the *fire code official.*

Shop drawings for fire alarm systems shall be prepared in accordance with NFPA 72 and submitted for review and approval prior to system installation.

[F] 907.1.3 Equipment. Systems and components shall be *listed* and *approved* for the purpose for which they are installed.

[F] 907.2 Where required—new buildings and structures. An *approved* fire alarm system installed in accordance with the provisions of this code and NFPA 72 shall be provided in new buildings and structures in accordance with Sections 907.2.1 through 907.2.23 and provide occupant notification in accordance with Section 907.5, unless other requirements are provided by another section of this code.

Not fewer than one manual fire alarm box shall be provided in an *approved* location to initiate a fire alarm signal for fire alarm systems employing automatic fire detectors or waterflow detection devices. Where other sections of this code allow elimination of fire alarm boxes due to sprinklers, a single fire alarm box shall be installed.

Exceptions:

1. The manual fire alarm box is not required for fire alarm systems dedicated to elevator recall control and supervisory service.
2. The manual fire alarm box is not required for Group R-2 occupancies unless required by the *fire code official* to provide a means for fire watch personnel to initiate an alarm during a sprinkler system impairment event. Where provided, the manual fire alarm box shall not be located in an area that is open to the public.

[F] 907.2.1 Group A. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group A occupancies where the occupant load due to the assembly occupancy is 300 or more, or

where the Group A occupant load is more than 100 persons above or below the *lowest level of exit discharge*. Group A occupancies not separated from one another in accordance with Section 707.3.10 shall be considered as a single occupancy for the purposes of applying this section. Portions of Group E occupancies occupied for assembly purposes shall be provided with a fire alarm system as required for the Group E occupancy.

Exception: Manual fire alarm boxes are not required where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 and the occupant notification appliances will activate throughout the notification zones upon sprinkler water flow.

[F] 907.2.1.1 System initiation in Group A occupancies with an occupant load of 1,000 or more. Activation of the fire alarm in Group A occupancies with an *occupant load* of 1,000 or more shall initiate a signal using an emergency voice/alarm communications system in accordance with Section 907.5.2.2.

Exception: Where *approved*, the prerecorded announcement is allowed to be manually deactivated for a period of time, not to exceed 3 minutes, for the sole purpose of allowing a live voice announcement from an *approved, constantly attended location.*

[F] 907.2.1.2 Emergency voice/alarm communication captions. Stadiums, arenas and grandstands required to caption audible public announcements shall be in accordance with Section 907.5.2.2.4.

[F] 907.2.2 Group B. A manual fire alarm system shall be installed in Group B occupancies where one of the following conditions exists:

1. The combined Group B *occupant load* of all floors is 500 or more.
2. The Group B *occupant load* is more than 100 persons above or below the lowest *level of exit discharge*.
3. The *fire area* contains an ambulatory care facility.

Exception: Manual fire alarm boxes are not required where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 and the occupant notification appliances will activate throughout the notification zones upon sprinkler water flow.

[F] 907.2.2.1 Ambulatory care facilities. *Fire areas* containing ambulatory care facilities shall be provided with an electronically supervised automatic smoke detection system installed within the ambulatory care facility and in public use areas outside of tenant spaces, including public *corridors* and elevator lobbies.

Exception: Buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, provided that the occupant notification appliances will activate throughout the notification zones upon sprinkler waterflow.

[W][F] 907.2.3 Group E. ((~~A manual fire alarm system that initiates the occupant notification signal utilizing an emergency voice/alarm communication system meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall be installed in Group E occupancies. Where *automatic sprinkler systems* or smoke detectors are installed, such systems or detectors shall be connected to the building fire alarm system.~~)) Group E occupancies shall be provided with a manual fire alarm system that initiates the occupant notification signal utilizing one of the following:

1. An emergency voice/alarm communication system meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6; or
2. A system developed as part of a safe school plan adopted in accordance with RCW 28A.320.125 or developed as part of an emergency response system consistent with the provisions of RCW 28A.320.126. The system must achieve all of the following performance standards:
   - 2.1 The ability to broadcast voice messages or customized announcements;
   - 2.2 Includes a feature for multiple sounds, including sounds to initiate a lock down;
   - 2.3 The ability to deliver messages to the interior of a building, areas outside of a building as designated pursuant to the safe school plan, and to personnel;
   - 2.4 The ability for two-way communications;
   - 2.5 The ability for individual room calling;
   - 2.6 The ability for a manual override;
   - 2.7 Installation in accordance with NFPA 72;
   - 2.8 Provide 15 minutes of battery backup for alarm and 24 hours of battery backup for standby; and
   - 2.9 Includes a program for annual inspection and maintenance in accordance with NFPA 72.

Exceptions:

1. A manual fire alarm system is not required in Group E occupancies with an *occupant load* of 50 or less.

2. Emergency voice/alarm communication systems meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall not be required in Group E occupancies with occupant loads of 100 or less, provided that activation of the manual fire alarm system initiates an *approved* occupant notification signal in accordance with Section 907.5.
3. Where an existing approved alarm system is in place, an emergency voice/alarm system is not required in any portion of an existing Group E building undergoing any one of the following repairs, alteration or addition:
   3.1 Alteration or repair to an existing building including, without limitation, alterations to rooms and systems, and/or corridor configurations, not exceeding 35 percent of the fire area of the building (or the fire area undergoing the alteration or repair if the building is comprised of two or more fire areas); or
   3.2 An addition to an existing building, not exceeding 35 percent of the fire area of the building (or the fire area to which the addition is made if the building is comprised of two or more fire areas).

((~~3~~)) 4. Manual fire alarm boxes are not required in Group E occupancies where all of the following apply:

((~~3.1~~)) 4.1. Interior *corridors* are protected by smoke detectors.

((~~3.2~~)) 4.2. Auditoriums, cafeterias, gymnasiums and similar areas are protected by *heat detectors* or other *approved* detection devices.

((~~3.3~~)) 4.3. Shops and laboratories involving dusts or vapors are protected by *heat detectors* or other *approved* detection devices.

((4)) 5. Manual fire alarm boxes shall not be required in Group E occupancies where all of the following apply:

((~~4.1~~)) 5.1. The building is equipped throughout with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1.

((~~4.2~~)) 5.2. The emergency voice/alarm communication system will activate on sprinkler waterflow.

((~~4.3. Manual activation is provided from a normally occupied location.~~))

[W][F] 907.2.3.1 Sprinkler systems or detection. When automatic sprinkler systems or smoke detectors are installed, such systems or detectors shall be connected to the building fire alarm system.

[F] 907.2.4 Group F. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group F occupancies where both of the following conditions exist:

1. The Group F occupancy is two or more *stories* in height.
2. The Group F occupancy has a combined *occupant load* of 500 or more above or below the lowest *level of exit discharge*.

Exception: Manual fire alarm boxes are not required where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 and the occupant notification appliances will activate throughout the notification zones upon sprinkler water flow.

[F] 907.2.5 Group H. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group H-5 occupancies and in occupancies used for the manufacture of organic coatings. An automatic smoke detection system shall be installed for highly toxic gases, organic peroxides and oxidizers in accordance with Chapters 60, 62 and 63, respectively, of the *International Fire Code*.

[F] 907.2.6 Group I. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group I occupancies. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.5 shall be provided in accordance with Sections 907.2.6.1, 907.2.6.2, and 907.2.6.3.3.

Exceptions:

1. Manual fire alarm boxes in sleeping units of Group I-1 and I-2 occupancies shall not be required at *exits* if located at all care providers' control stations or other constantly attended staff locations, provided that such manual fire alarm boxes are visible and provided with *ready access*, and the distances of travel required in Section 907.4.2.1 are not exceeded.
2. Occupant notification systems are not required to be activated where private mode signaling installed in accordance with NFPA 72 is *approved* by the fire code official and staff evacuation responsibilities are included in the fire safety and evacuation plan required by Section 404 of the *International Fire Code*.

[S][F] 907.2.6.1 Group I-1. In Group I-1 occupancies, an automatic smoke detection system shall be installed in *corridors*, waiting areas open to *corridors* and *habitable spaces* other than *sleeping units* and kitchens. The system shall be activated in accordance with Section ((~~907.5~~)) 907.4.

Exceptions:

1. For Group I-1, Condition 1 occupancies, smoke detection in *habitable spaces* is not required where the facility is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1.
2. Smoke detection is not required for exterior balconies.

[F] 907.2.6.1.1 Smoke alarms. Single- and multiple-station smoke alarms shall be installed in accordance with Section 907.2.10.

[F] 907.2.6.2 Group I-2. An automatic smoke detection system shall be installed in *corridors* in Group I-2, Condition 1 facilities and spaces permitted to be open to the *corridors* by Section 407.2. The system shall be activated in accordance with Section 907.4. Group I-2, Condition 2 occupancies shall be equipped with an automatic smoke detection system as required in Section 407.

Exceptions:

1. Corridor smoke detection is not required in smoke compartments that contain sleeping units where such units are provided with smoke detectors that comply with UL 268. Such detectors shall provide a visual display on the corridor side of each sleeping unit and shall provide an audible and visual alarm at the care providers' station attending each unit.
2. Corridor smoke detection is not required in smoke compartments that contain sleeping units where sleeping unit doors are equipped with automatic door-closing devices with integral smoke detectors on the unit sides installed in accordance with their listing, provided that the integral detectors perform the required alerting function.

[F] 907.2.6.3 Group I-3 occupancies. Group I-3 occupancies shall be equipped with a manual fire alarm system and automatic smoke detection system installed for alerting staff.

[F] 907.2.6.3.1 System initiation. Actuation of an automatic fire-extinguishing system, *automatic sprinkler system*, a manual fire alarm box or a fire detector shall initiate an approved fire alarm signal that automatically notifies staff.

[F] 907.2.6.3.2 Manual fire alarm boxes. Manual fire alarm boxes are not required to be located in accordance with Section 907.4.2 where the fire alarm boxes are provided at staff-attended locations having direct supervision over areas where manual fire alarm boxes have been omitted.

[F] 907.2.6.3.2.1 Manual fire alarm boxes in detainee areas. Manual fire alarm boxes are allowed to be locked in areas occupied by detainees, provided that staff members are present within the subject area and have keys readily available to operate the manual fire alarm boxes.

[F] 907.2.6.3.3 Automatic smoke detection system. An automatic smoke detection system shall be installed throughout resident housing areas, including *sleeping units* and contiguous day rooms, group activity spaces and other common spaces normally open to residents.

Exceptions:

1. Other *approved* smoke detection arrangements providing equivalent protection, including, but not limited to, placing detectors in exhaust ducts from cells or behind protective guards *listed* for the purpose, are allowed where necessary to prevent damage or tampering.
2. *Sleeping units* in Use Conditions 2 and 3 as described in Section 308.
3. Smoke detectors are not required in *sleeping units* with four or fewer occupants in smoke compartments that are equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1.

[W] 907.2.6.4 Group I-4 occupancies. A manual fire alarm system that initiates the occupant notification signal using an emergency voice/alarm communication system meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall be installed in Group I-4 occupancies. When *automatic sprinkler systems* or smoke detectors are installed, such systems or detectors shall be connected to the building fire alarm system.

Exceptions:

1. A manual fire alarm system is not required in Group I-4 occupancies with an occupant load of 50 or less.
2. Emergency voice alarm communication systems meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall not be required in Group I-4 occupancies with occupant loads of 100 or less, provided that activation of the manual fire alarm system initiates an approved occupant notification signal in accordance with Section 907.5.

[F] 907.2.7 Group M. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group M occupancies where one of the following conditions exists:

1. The combined Group M *occupant load* of all floors is 500 or more persons.
2. The Group M *occupant load* is more than 100 persons above or below the lowest *level of exit discharge.*

Exceptions:

1. A manual fire alarm system is not required in *covered or open mall buildings* complying with Section 402.
2. Manual fire alarm boxes are not required where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 and the occupant notification appliances will automatically activate throughout the notification zones upon sprinkler water flow.

[S] ((~~[F] 907.2.7.1 Occupant notification.~~ ~~During times that the building is occupied, the initiation of a signal from a manual fire alarm box or from a waterflow switch shall not be required to activate the alarm notification appliances when an alarm signal is activated at a *constantly attended location* from which evacuation instructions shall be initiated over an emergency voice/alarm communication system installed in accordance with Section 907.5.2.2.~~))

[F] 907.2.8 Group R-1. Fire alarm systems and smoke alarms shall be installed in Group R-1 occupancies as required in Sections 907.2.8.1 through 907.2.8.3.

[F] 907.2.8.1 Manual fire alarm system. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group R- 1 occupancies.

Exceptions:

1. A manual fire alarm system is not required in buildings not more than two *stories* in height where all individual *sleeping units* and contiguous *attic* and crawl spaces to those units are separated from each other and public or common areas by not less than 1-hour *fire partitions* and each individual *sleeping unit* has an *exit* directly to a *public way*, *egress court* or *yard*.
2. Manual fire alarm boxes are not required throughout the building where all of the following conditions are met:
   - 2.1. The building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2.
   - 2.2. The notification appliances will activate upon sprinkler water flow.
   - 2.3. Not fewer than one manual fire alarm box is installed at an *approved* location.

[S][F] 907.2.8.2 Automatic ((~~smoke~~)) detection system. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.5 shall be installed throughout all interior *corridors* serving *sleeping units*. Automatic heat detectors shall be provided in any non-sprinklered interior areas outside guestrooms other than *attics* and crawl spaces.

Exception: An automatic smoke detection system is not required in buildings that do not have interior *corridors* serving *sleeping units* and where each *sleeping unit* has a *means of egress* door opening directly to an *exit* or to an exterior *exit access* that leads directly to an *exit*.

[F] 907.2.8.3 Smoke alarms. Single- and multiple-station smoke alarms shall be installed in accordance with Section 907.2.10.

[S][F] 907.2.9 Group R-2. Fire alarm systems and smoke alarms shall be installed in Group R-2 occupancies as required in Sections 907.2.9.1 through 907.2.9.3.

[F] 907.2.9.1 Manual fire alarm system. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group R-2 occupancies where any of the following conditions apply:

1. Any *dwelling unit* or *sleeping unit* is located three or more *stories* above the lowest *level of exit discharge*.
2. Any *dwelling unit* or *sleeping unit* is located more than one *story* below the highest *level of exit discharge* of *exits* serving the *dwelling unit* or *sleeping unit*.
3. The building contains more than 16 *dwelling units* or *sleeping units*.
4. The building contains a boarding home licensed by the state of Washington.

Exceptions:

1. A fire alarm system is not required in buildings not more than two *stories* in height where all *dwelling units* or *sleeping units* and contiguous *attic* and crawl spaces are separated from each other and public or common areas by not less than 1-hour *fire partitions* and each *dwelling unit* or *sleeping unit* has an *exit* directly to a *public way*, *egress court* or *yard*.
2. Manual fire alarm boxes are not required where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2 and the occupant notification appliances will automatically activate throughout the notification zones upon a sprinkler water flow.
3. A fire alarm system is not required in buildings that do not have interior *corridors* serving *dwelling units* and are protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, provided that *dwelling units* either have a *means of egress* door opening directly to an exterior *exit access* that

leads directly to the *exits* or are served by open-ended *corridors* designed in accordance with Section 1027.6, Exception 3.

4. A fire alarm system is not required in townhouses where approved by the *fire code official*.
5. In boarding homes licensed by the state of Washington, manual fire alarm boxes in resident sleeping areas are not required at exits if located at all constantly attended staff locations if such staff locations are visible, continuously accessible, located on each floor, and positioned so no portion of the *story* exceeds a horizontal travel distance of 200 feet to a manual fire alarm box.

[F] 907.2.9.2 Smoke alarms. Single- and multiple-station smoke alarms shall be installed in accordance with Section 907.2.10.

[F] 907.2.9.3 Group R-2 college and university buildings. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group R-2 occupancies operated by a college or university for student or staff housing in all of the following locations:

1. Common spaces outside of *dwelling units* and *sleeping units*.
2. Laundry rooms, mechanical equipment rooms and storage rooms.
3. All interior corridors serving *sleeping units* or *dwelling units*.

Exception: An automatic smoke detection system is not required in buildings that do not have interior *corridors* serving *sleeping units* or *dwelling units* and where each *sleeping unit* or *dwelling unit* either has a *means of egress* door opening directly to an exterior *exit access* that leads directly to an *exit* or a *means of egress* door opening directly to an *exit*.

Required smoke alarms in *dwelling units* and *sleeping units* in Group R-2 occupancies operated by a college or university for student or staff housing shall be interconnected with the fire alarm system in accordance with NFPA 72.

[S] 907.2.9.4 Automatic heat detection. An automatic heat detection system that activates the occupant notification system in accordance with Section 907.6 shall be installed throughout all unsprinklered interior areas outside dwelling or sleeping units other than *attics* and crawl spaces.

[F] 907.2.10 Single- and multiple-station smoke alarms. *Listed* single- and multiple-station smoke alarms complying with UL 217 shall be installed in accordance with Sections 907.2.10.1 through 907.2.10.7 and NFPA 72.

[F] 907.2.10.1 Group R-1. Single- or multiple-station smoke alarms shall be installed in all of the following locations in Group R-1:

1. In sleeping areas.
2. In every room in the path of the *means of egress* from the sleeping area to the door leading from the *sleeping unit*.
3. In each *story* within the *sleeping unit*, including basements. For *sleeping units* with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full *story* below the upper level.

[S][F] 907.2.10.2 Groups R-2, R-3 ((~~, R-4~~)) and I-1. Single- or multiple-station smoke alarms shall be installed and maintained in Groups R-2, R-3 ((~~, R-4~~)) and I-1 regardless of *occupant load* at all of the following locations:

1. On the ceiling or wall outside of each separate sleeping area in the immediate vicinity of bedrooms.
2. In each room used for sleeping purposes.
3. In each *story* within a *dwelling unit*, including basements but not including crawl spaces and uninhabitable *attics*. In *dwellings* or *dwelling units* with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full *story* below the upper level.

[F] 907.2.10.3 Installation near cooking appliances. Smoke alarms shall not be installed in the following locations unless this would prevent placement of a smoke alarm in a location required by Section 907.2.10.1 or 907.2.10.2:

1. Ionization smoke alarms shall not be installed less than 20 feet (6096 mm) horizontally from a permanently installed cooking appliance.
2. Ionization smoke alarms with an alarm-silencing switch shall not be installed less than 10 feet (3048 mm) horizontally from a permanently installed cooking appliance.
3. Photoelectric smoke alarms shall not be installed less than 6 feet (1829 mm) horizontally from a permanently installed cooking appliance.

[F] 907.2.10.4 Installation near bathrooms. Smoke alarms shall be installed not less than 3 feet (914 mm) horizontally from the door or opening of a bathroom that contains a bathtub or shower unless this would prevent placement of a smoke alarm required by Section 907.2.10.1 or 907.2.10.2.

[F] 907.2.10.5 Interconnection. Where more than one smoke alarm is required to be installed within an individual *dwelling unit* or *sleeping unit* in Group R or I-1 occupancies, the smoke alarms shall be interconnected in such a manner that the activation of one alarm will activate all of the alarms in the individual unit. Physical interconnection of smoke alarms shall not be required where listed wireless alarms are installed and all alarms sound upon activation of one alarm. The alarm shall be clearly audible in all bedrooms over background noise levels with all intervening doors closed.

[S][F] 907.2.10.6 Power source. In new construction, required smoke alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and shall be equipped with a battery backup. Smoke alarms with integral strobes that are not equipped with battery backup shall be connected to an emergency ((~~electrical~~)) power system in accordance with Section 2702. Smoke alarms shall emit a signal when the batteries are low. Wiring shall be permanent and without a disconnecting switch other than as required for overcurrent protection.

Exception: Smoke alarms are not required to be equipped with battery backup where they are connected to an emergency electrical system that complies with Section 2702.

[F] 907.2.10.7 Smoke detection system. Smoke detectors listed in accordance with UL 268 and provided as part of the building *fire alarm system* shall be an acceptable alternative to single- and multiple-station *smoke alarms* and shall comply with the following:

1. The *fire alarm system* shall comply with all applicable requirements in Section 907.
2. Activation of a smoke detector in a *dwelling unit* or *sleeping unit* shall initiate alarm notification in the *dwelling unit* or *sleeping unit* in accordance with Section 907.5.2.
3. Activation of a smoke detector in a *dwelling unit* or *sleeping unit* shall not activate alarm notification appliances outside of the *dwelling unit* or *sleeping unit*, provided that a supervisory signal is generated and monitored in accordance with Section 907.6.6.

[F] 907.2.11 Special amusement buildings. An automatic smoke detection system shall be provided in *special amusement buildings* in accordance with Sections 907.2.11.1 through 907.2.11.3.

[F] 907.2.11.1 Alarm. Activation of any single smoke detector, the *automatic sprinkler system* or any other automatic fire detection device shall immediately activate an audible and visible alarm at the building at a constantly attended location from which emergency action can be initiated, including the capability of manual initiation of requirements in Section 907.2.11.2.

[F] 907.2.11.2 System response. The activation of two or more smoke detectors, a single smoke detector equipped with an alarm verification feature, the *automatic sprinkler system* or other *approved* fire detection device shall automatically do all of the following:

1. Cause illumination of the *means of egress* with light of not less than 1 footcandle (11 lux) at the walking surface level.
2. Stop any conflicting or confusing sounds and visual distractions.
3. Activate an *approved* directional *exit* marking that will become apparent in an emergency.
4. Activate a prerecorded message, audible throughout the *special amusement building*, instructing patrons to proceed to the nearest *exit*. Alarm signals used in conjunction with the prerecorded message shall produce a sound that is distinctive from other sounds used during normal operation.

[F] 907.2.11.3 Emergency voice/alarm communication system. An emergency voice/alarm communication system, which is allowed to serve as a public address system, shall be installed in accordance with Section 907.5.2.2 and be audible throughout the entire *special amusement building*.

[S][F] 907.2.12 High-rise buildings. High-rise buildings shall be provided with an automatic smoke detection system in accordance with Section 907.2.12.1, a fire department communication system in accordance with Section 907.2.12.2 and an emergency voice/alarm communication system in accordance with Section 907.5.2.2.

Exceptions:

1. Airport traffic control towers in accordance with Sections 412 and 907.2.21.
2. *Open parking garages* in accordance with Section 406.5.
3. Buildings with an occupancy in Group A-5 in accordance with Section 303.1.
4. Low-hazard special occupancies in accordance with Section 503.1..1.

((~~5. Buildings with an occupancy in Group H-1, H-2 or H-3 in accordance with Section 415.~~

~~6~~)) 5. In Group I-1 and I-2 occupancies, the alarm shall sound at a *constantly attended location* and occupant notification shall be broadcast by the emergency voice/alarm communication system.

[F] 907.2.12.1 Automatic smoke detection. Automatic smoke detection in high-rise buildings shall be in accordance with Sections 907.2.12.1.1 and 907.2.12.1.2.

[F] 907.2.12.1.1 Area smoke detection. Area smoke detectors shall be provided in accordance with this section. Smoke detectors shall be connected to an automatic fire alarm system. The activation of any detector required by this section shall activate the emergency voice/alarm communication system in accordance with Section 907.5.2.2. In addition to smoke detectors required by Sections 907.2.1 through 907.2.9, smoke detectors shall be located as follows:

1. In each mechanical equipment, electrical, transformer, telephone equipment or similar room that is not provided with sprinkler protection.
2. In each elevator machine room, machinery space, control room and control space and in elevator lobbies.

[F] 907.2.12.1.2 Duct smoke detection. Duct smoke detectors complying with Section 907.3.1 shall be located as follows:

1. In the main return air and exhaust air plenum of each air-conditioning system having a capacity greater than 2,000 cubic feet per minute (cfm) (0.94 m^3/s). Such detectors shall be located in a serviceable area downstream of the last duct inlet.
2. At each connection to a vertical duct or riser serving two or more stories from a return air duct or plenum of an air-conditioning system. In Group R-1 and R-2 occupancies, a smoke detector is allowed to be used in each return air riser carrying not more than 5,000 cfm (2.4 m^3/s) and serving not more than 10 air-inlet openings.

[S][F] 907.2.12.2 Fire department communication system. Where a wired communication system is *approved* in lieu of an emergency responder radio coverage system in accordance with Section 510 of the *International Fire Code*, the wired fire department communication system shall be designed and installed in accordance with NFPA 72 and shall operate between a fire command center complying with Section 911, elevators, elevator lobbies, emergency and standby power rooms, fire pump rooms, *areas of refuge* and inside *interior exit stairways*. The fire department communication device shall be provided at each floor level within the *interior exit stairway*. Eight portable handsets for the communication system shall be provided in the fire command center.

[F] 907.2.12.3 Multiple-channel voice evacuation. In buildings with an occupied floor more than 120 feet (36 576 mm) above the lowest level of fire department vehicle access, voice evacuation systems for high-rise buildings shall be multiple-channel systems.

[F] 907.2.13 Atriums connecting more than two stories. A fire alarm system shall be installed in occupancies with an atrium that connects more than two *stories*, with smoke detection installed in locations required by a rational analysis in Section 909.4 and in accordance with the system operation requirements in Section 909.17. The system shall be activated in accordance with Section 907.5. Such occupancies in Group A, E or M shall be provided with an emergency voice/alarm communication system complying with the requirements of Section 907.5.2.2.

[F] 907.2.14 High-piled combustible storage areas. An automatic smoke detection system shall be installed throughout high-piled combustible storage areas where required by Section 3206.5 of the *International Fire Code*.

[F] 907.2.15 Aerosol storage uses. Aerosol product rooms and general-purpose warehouses containing aerosol products shall be provided with an *approved* manual fire alarm system where required by the *International Fire Code*.

[F] 907.2.16 Lumber, wood structural panel and veneer mills. Lumber, wood structural panel and veneer mills shall be provided with a manual fire alarm system.

[F] 907.2.17 Underground buildings with smoke control systems. Where a smoke control system is installed in an underground building in accordance with this code, automatic smoke detectors shall be provided in accordance with Section 907.2.17.1.

[F] 907.2.17.1 Smoke detectors. Not fewer than one smoke detector *listed* for the intended purpose shall be installed in all of the following areas:

1. Mechanical equipment, electrical, transformer, telephone equipment, elevator machine or similar rooms.
2. Elevator lobbies.
3. The main return and exhaust air plenum of each air-conditioning system serving more than one *story* and located in a serviceable area downstream of the last duct inlet.
4. Each connection to a vertical duct or riser serving two or more floors from return air ducts or plenums of heating, ventilating and air-conditioning systems, except that in Group R occupancies, a *listed* smoke detector is allowed to be used in each return air riser carrying not more than 5,000 cfm (2.4 m^3/s) and serving not more than 10 air-inlet openings.

[F] 907.2.17.2 Alarm required. Activation of the smoke control system shall activate an audible alarm at a *constantly attended location*.

[F] 907.2.18 Deep underground buildings. Where the lowest level of a structure is more than 60 feet (18 288 mm) below the finished floor of the lowest *level of exit discharge*, the structure shall be equipped throughout with a manual fire alarm system, including an emergency voice/alarm communication system installed in accordance with Section 907.5.2.2.

[F] 907.2.19 Covered and open mall buildings. Where the total floor area exceeds 50,000 square feet (4645 m^2) within either a covered mall building or within the perimeter line of an open mall building, an emergency voice/alarm communication system shall be provided. Access to emergency voice/alarm communication systems serving a mall, required or otherwise, shall be provided for the fire department. The system shall be provided in accordance with Section 907.5.2.2.

[F] 907.2.20 Residential aircraft hangars. Not fewer than one single-station smoke alarm shall be installed within a residential aircraft hangar as defined in Chapter 2 and shall be interconnected into the residential smoke alarm or other sounding device to provide an alarm that will be audible in all sleeping areas of the *dwelling*.

[F] 907.2.21 Airport traffic control towers. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.5 shall be provided in airport control towers in accordance with Sections 907.2.21.1 and 907.2.21.2.

Exception: Audible appliances shall not be installed within the control tower cab.

[F] 907.2.21.1 Airport traffic control towers with multiple exits and automatic sprinklers. Airport traffic control towers with multiple *exits* and equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 shall be provided with smoke detectors in all of the following locations:

1. Airport traffic control cab.
2. Electrical and mechanical equipment rooms.
3. Airport terminal radar and electronics rooms.
4. Outside each opening into *interior exit stairways*.
5. Along the single *means of egress* permitted from observation levels.
6. Outside each opening into the single *means of egress* permitted from observation levels.

[F] 907.2.21.2 Other airport traffic control towers. Airport traffic control towers with a single *exit* or where sprinklers are not installed throughout shall be provided with smoke detectors in all of the following locations:

1. Airport traffic control cab.
2. Electrical and mechanical equipment rooms.
3. Airport terminal radar and electronics rooms.
4. Office spaces incidental to the tower operation.
5. Lounges for employees, including sanitary facilities.
6. *Means of egress*.
7. Utility shafts where access to smoke detectors can be provided.

[F] 907.2.22 Battery rooms. An automatic smoke detection system shall be installed in areas containing stationary storage battery systems as required in Section 1206.2 of the *International Fire Code*.

[F] 907.2.23 Capacitor energy storage systems. An automatic smoke detection system shall be installed in areas containing capacitor energy storage systems as required by Section 1206.3 of the *International Fire Code.*

[F] 907.3 Fire safety functions. Automatic fire detectors utilized for the purpose of performing fire safety functions shall be connected to the building's fire alarm control unit where a fire alarm system is required by Section 907.2. Detectors shall, upon actuation, perform the intended function and activate the alarm notification appliances or activate a visible and audible supervisory signal at a *constantly attended location*. In buildings not equipped with a fire alarm system, the automatic fire detector shall be powered by normal electrical service and, upon actuation, perform the intended function. The detectors shall be located in accordance with NFPA 72.

[S][F] 907.3.1 Duct smoke detectors. Smoke detectors installed in ducts shall be *listed* for the air velocity, temperature and humidity present in the duct. Duct smoke detectors shall be connected to the building's fire alarm control unit where a fire alarm system is required by Section 907.2. Activation of a duct smoke detector shall initiate a visible and audible supervisory signal at a *constantly attended location* and shall perform the intended fire safety function in accordance with this code and the *International Mechanical Code*. In facilities that are required to be monitored by a supervising station, duct smoke detectors shall report only as a supervisory signal and not as a fire alarm. They shall not be used as a substitute for required open area detection <u>and shall not activate the occupant notification system</u>.

((~~**Exceptions:**~~

~~1. The supervisory signal at a *constantly attended location* is not required where duct smoke detectors activate the building's alarm notification appliances.~~

~~2.~~)) **Exception:** In occupancies not required to be equipped with a fire alarm system, actuation of a smoke detector shall activate a visible and an audible signal in an *approved* location. Smoke detector trouble conditions shall activate a visible or audible signal in an *approved* location and shall be identified as air duct detector trouble.

[F] 907.3.2 Special locking systems. Where special locking systems are installed on *means of egress* doors in accordance with Sections 1010.1.9.7 or 1010.1.9.8, an automatic detection system shall be installed as required by that section.

[S][F] 907.3.3 Elevator emergency operation. Automatic fire detectors installed for elevator emergency operation shall be installed in accordance with the provisions of ((~~ASME A17.1/CSA B44 and NFPA 72~~)) rules promulgated by the building or *fire code official*.

[F] 907.3.4 Wiring. The wiring to the auxiliary devices and equipment used to accomplish the fire safety functions shall be monitored for integrity in accordance with NFPA 72.

[F] 907.4 Initiating devices. Where manual or automatic alarm initiation is required as part of a fire alarm system, the initiating devices shall be installed in accordance with Sections 907.4.1 through 907.4.3.1.

[F] 907.4.1 Protection of fire alarm control unit. In areas that are not continuously occupied, a single smoke detector shall be provided at the location of each fire alarm control unit, notification appliance circuit power extenders, and supervising station transmitting equipment.

Exception: Where ambient conditions prohibit installation of a smoke detector, a *heat detector* shall be permitted.

[F] 907.4.2 Manual fire alarm boxes. Where a manual fire alarm system is required by another section of this code, it shall be activated by fire alarm boxes installed in accordance with Sections 907.4.2.1 through 907.4.2.6.

[F] 907.4.2.1 Location. Manual fire alarm boxes shall be located not more than 5 feet (1524 mm) from the entrance to each *exit*. In buildings not protected by an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2, additional manual fire alarm boxes shall be located so that the distance of travel to the nearest box does not exceed 200 feet (60 960 mm).

[F] 907.4.2.2 Height. The height of the manual fire alarm boxes shall be not less than 42 inches (1067 mm) and not more than 48 inches (1372 mm) measured vertically, from the floor level to the activating handle or lever of the box.

[F] 907.4.2.3 Color. Manual fire alarm boxes shall be red in color.

[F] 907.4.2.4 Signs. Where fire alarm systems are not monitored by a supervising station, an *approved* permanent sign shall be installed adjacent to each manual fire alarm box that reads: WHEN ALARM SOUNDS CALL FIRE DEPARTMENT.

Exception: Where the manufacturer has permanently provided this information on the manual fire alarm box.

[F] 907.4.2.5 Protective covers. The fire code official is authorized to require the installation of *listed* manual fire alarm box protective covers to prevent malicious false alarms or to provide the manual fire alarm box with protection from physical damage. The protective cover shall be transparent or red in color with a transparent face to permit visibility of the manual fire alarm box. Each cover shall include proper operating instructions. A protective cover that emits a local alarm signal shall not be installed unless *approved*. Protective covers shall not project more than that permitted by Section 1003.3.3.

[F] 907.4.2.6 Unobstructed and unobscured. Manual fire alarm boxes shall be provided with ready access, unobstructed, unobscured and visible at all times.

[F] 907.4.3 Automatic smoke detection. Where an automatic smoke detection system is required it shall utilize smoke detectors unless ambient conditions prohibit such an installation. In spaces where smoke detectors cannot be utilized due to ambient conditions, *approved* automatic *heat detectors* shall be permitted.

[F] 907.4.3.1 Automatic sprinkler system. For conditions other than specific fire safety functions noted in Section 907.3, in areas where ambient conditions prohibit the installation of smoke detectors, an *automatic sprinkler system* installed in such areas in accordance with Section 903.3.1.1 or 903.3.1.2 and that is connected to the fire alarm system shall be *approved* as automatic heat detection.

[F] 907.5 Occupant notification systems. A fire alarm system shall annunciate at the fire alarm control unit and shall initiate occupant notification upon activation, in accordance with Sections 907.5.1 through 907.5.2.3.3. Where a fire alarm system is required by another section of this code, it shall be activated by:

1. Automatic fire detectors.
2. *Automatic sprinkler system* waterflow devices.
3. Manual fire alarm boxes.

4. Automatic fire-extinguishing systems.

Exception: Where notification systems are allowed elsewhere in Section 907 to annunciate at a *constantly attended location*.

[F] 907.5.1 Presignal feature. A presignal feature shall not be installed unless *approved* by the fire code official. Where a presignal feature is provided, a signal shall be annunciated at a *constantly attended location approved* by the *fire code official* so that occupant notification can be activated in the event of fire or other emergency.

[F] 907.5.2 Alarm notification appliances. Alarm notification appliances shall be provided and shall be *listed* for their purpose.

[S][F] 907.5.2.1 Audible alarms. Audible alarm notification appliances shall be provided and emit a distinctive sound that is not to be used for any purpose other than that of a fire alarm.

Exceptions:

1. Audible alarm notification appliances are not required in critical care areas of Group I-2, Condition 2 occupancies that are in compliance with Section 907.2.6, Exception 2.
2. A visible alarm notification appliance installed in a nurses' control station or other continuously attended staff location in a Group I-2, Condition 2 suite shall be an acceptable alternative to the installation of audible alarm notification appliances throughout the suite in Group I-2, Condition 2 occupancies that are in compliance with Section 907.2.6, Exception 2.
3. Where provided, audible notification appliances located in each enclosed occupant evacuation elevator lobby in accordance with Section ((~~3008.9.1~~)) 403.6.2.10.1 shall be connected to a separate notification zone for manual paging only.

[S][F] 907.5.2.1.1 Average sound pressure. The audible alarm notification appliances shall provide a sound pressure level of 15 decibels (dBA) above the average ambient sound level or 5 dBA above the maximum sound level having a duration of not less than 60 seconds, whichever is greater, in every occupiable space within the building. The minimum sound pressure levels shall be: 75 dBA in occupancies in Groups R and I-Condition 1; 90 dBA in mechanical equipment rooms; and 60 dBA in other occupancies.

Exceptions:

1. Private mode signaling in accordance with NFPA 72 is allowed in areas of I-2 and I-3 occupancies if occupants are not expected to self-evacuate.
2. Alarm systems installed in selected parts of a building are required to meet sound pressure requirements within the selected area of the building only.

[W][S][F] 907.5.2.1.2 ((~~Maximum~~)) Total sound pressure. The ((~~maximum~~)) total sound pressure level ((~~for audible alarm~~)) produced by combining the ambient sound pressure level with all audible notification appliances operating shall ((~~be~~)) not exceed 110 dBA at the minimum hearing distance from the audible appliance. Where the average ambient noise is greater than ((~~95~~)) 105 dBA, visible alarm notification appliances shall be provided in accordance with NFPA 72 and audible alarm notification appliances shall not be required.

[S][F] 907.5.2.2 Emergency voice/alarm communication systems. Emergency voice/alarm communication systems required by this code shall be designed and installed in accordance with NFPA 72. The operation of any automatic fire detector, sprinkler waterflow device or manual fire alarm box shall automatically sound an alert tone followed by voice instructions giving *approved* information and directions for a general or staged evacuation in accordance with the building's fire safety and evacuation plans required by Section 404 of the *International Fire Code*. In high-rise buildings, the system shall operate on at least the alarming floor, the floor above and ((~~the floor~~)) 2 floors below. Speakers shall be provided throughout the building by paging zones. At a minimum, paging zones shall be provided as follows:

1. Elevator groups.
2. *Interior exit stairways.*
3. Each floor.
4. *Areas of refuge* as defined in Chapter 2.

Exception: In Group I-1 and I-2 occupancies, the alarm shall sound in a constantly attended area and a general occupant notification shall be broadcast over the overhead page.

[F] 907.5.2.2.1 Manual override. A manual override for emergency voice communication shall be provided on a selective and all-call basis for all paging zones.

[F] 907.5.2.2.2 Live voice messages. The emergency voice/alarm communication system shall have the capability to broadcast live voice messages by paging zones on a selective and all-call basis.

[F] 907.5.2.2.3 Alternative uses. The emergency voice/alarm communication system shall be allowed to be used for other announcements, provided that the manual fire alarm use takes precedence over any other use.

[F] 907.5.2.2.4 Emergency voice/alarm communication captions. Where stadiums, arenas and grandstands have 15,000 fixed seats or more and provide audible public announcements, the emergency voice/alarm communication system shall provide prerecorded or real-time captions. Prerecorded or live emergency captions shall be from an *approved* location constantly attended by personnel trained to respond to an emergency.

[F] 907.5.2.2.5 Emergency power. Emergency voice/alarm communications systems shall be provided with emergency power in accordance with Section 2702. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in NFPA 72.

[S][F] 907.5.2.3 Visible alarms. Visible alarm notification appliances shall be provided in accordance with Sections 907.5.2.3.1 through 907.5.2.3.3 and rules promulgated by the *building official* or *fire code official*.

Exceptions:

1. Visible alarm notification appliances are not required in *alterations*, except where an existing fire alarm system is upgraded or replaced, or a new fire alarm system is installed.
2. Visible alarm notification appliances shall not be required in *exits* as defined in Chapter 2.
3. Visible alarm notification appliances shall not be required in elevator cars.
4. Visual alarm notification appliances are not required in critical care areas of Group I-2, Condition 2 occupancies that are in compliance with Section 907.2.6, Exception 2.

[F] 907.5.2.3.1 Public use areas and common use areas. Visible alarm notification appliances shall be provided in *public use areas* and *common use areas*.

Exception: Where employee work areas have audible alarm coverage, the notification appliance circuits serving the employee work areas shall be initially designed with not less than 20-percent spare capacity to account for the potential of adding visible notification appliances in the future to accommodate hearing-impaired employee(s).

[F] 907.5.2.3.2 Groups I-1 and R-1. Habitable spaces in dwelling units and sleeping units in Group I-1 and R-1 occupancies in accordance with Table 907.5.2.3.2 shall be provided with visible alarm notification. Visible alarms shall be activated by the in-room smoke alarm and the building fire alarm system.

[F] TABLE 907.5.2.3.2
VISIBLE ALARMS

NUMBER OF SLEEP UNITS	SLEEPING ACCOMMODATIONS WITH VISIBLE ALARMS
6 to 25	2
26 to 50	4
51 to 75	7
76 to 100	9
101 to 150	12
151 to 200	14
201 to 300	17
301 to 400	20
401 to 500	22
501 to 1,000	5% of total
1,001 and over	50 plus 3 for each 100 over 1,000

[F] 907.5.2.3.3 Group R-2. In Group R-2 occupancies required by Section 907 to have a fire alarm system, each *story* that contains *dwelling units* and *sleeping units* shall be provided with the capability to support visible alarm notification appliances in accordance with Chapter 10 of ICC A117.1. Such capability shall accommodate wired or wireless equipment. The future capability shall include one of the following:

1. The interconnection of the building fire alarm system with the unit smoke alarms.
2. The replacement of audible appliances with combination audible/visible appliances.
3. The future extension of the existing wiring from the unit smoke alarm locations to required locations for visible appliances.

[F] 907.6 Installation and monitoring. A fire alarm system shall be installed and monitored in accordance with Sections 907.6.1 through 907.6.6.2 and NFPA 72.

[S][F] 907.6.1 Wiring. Wiring shall comply with the requirements of ((~~NFPA 70~~)) the *Seattle Electrical Code* and NFPA 72. Wireless protection systems utilizing radio-frequency transmitting devices shall comply with the special requirements for supervision of low-power wireless systems in NFPA 72.

[F] 907.6.2 Power supply. The primary and secondary power supply for the fire alarm system shall be provided in accordance with NFPA 72.

Exception: Back-up power for single-station and multiple-station smoke alarms as required in Section 907.2.10.6.

[F] 907.6.3 Initiating device identification. The fire alarm system shall identify the specific initiating device address, location, device type, floor level where applicable and status including indication of normal, alarm, trouble and supervisory status, as appropriate.

Exceptions:

1. Fire alarm systems in single-story buildings less than 22,500 square feet (2090 m^2) in area.
2. Fire alarm systems that only include manual fire alarm boxes, waterflow initiating devices and not more than 10 additional alarm-initiating devices.
3. Special initiating devices that do not support individual device identification.
4. Fire alarm systems or devices that are replacing existing equipment.

[F] 907.6.3.1 Annunciation. The initiating device status shall be annunciated at an *approved* on-site location.

[S][F] 907.6.4 Zones. Each floor shall be zoned separately and a zone shall not exceed 22,500 square feet (2090 m^2). The length of any zone shall not exceed 300 feet (91 440 mm) in any direction.

Exception: *Automatic sprinkler system* zones shall not exceed the area permitted by NFPA 13.

[F] 907.6.4.1 ((~~Zoning indicator~~)) Annunciator panel. ((~~A zoning indicator panel and the associated controls shall be provided in an *approved* location.~~)) All fire alarm systems in buildings without a fire command center shall be provided with an annunciator panel (or the main fire alarm control panel) located inside the building at the main building entrance. The visual zone indication shall lock in until the system is reset and shall not be canceled by the operation of an audible-alarm silencing switch.

[F] 907.6.4.2 High-rise buildings. In high-rise buildings, a separate zone by floor shall be provided for each of the following types of alarm-initiating devices where provided:

1. Smoke detectors.
2. Sprinkler waterflow devices.
3. Manual fire alarm boxes.
4. Other *approved* types of automatic fire detection devices or suppression systems.

[F] 907.6.5 Access. Access shall be provided to each fire alarm device and notification appliance for periodic inspection, maintenance and testing.

[S][F] 907.6.6 Monitoring. Fire alarm systems required by this chapter or by the *International Fire Code* shall be monitored by an *approved* supervising station in accordance with NFPA 72.

Exception: Monitoring by a supervising station is not required for:

1. Single- and multiple-station smoke alarms required by Section 907.2.10.
2. Smoke detectors in Group I-3 occupancies.
3. *Automatic sprinkler systems* in one- and two-family dwellings and townhouses.

[F] 907.6.6.1 Automatic telephone-dialing devices. Automatic telephone-dialing devices used to transmit an emergency alarm shall not be connected to any fire department telephone number unless *approved* by the fire chief.

[F] 907.6.6.2 Termination of monitoring service. Termination of fire alarm monitoring services shall be in accordance with Section 901.9 of the *International Fire Code*.

[S][F] 907.7 Acceptance tests and completion. Upon completion of the installation, and after the electrical inspector has approved the installation, the fire alarm system and all fire alarm components shall be tested in accordance with NFPA 72.

[F] 907.7.1 Single- and multiple-station alarm devices. When the installation of the alarm devices is complete, each device and interconnecting wiring for multiple-station alarm devices shall be tested in accordance with the smoke alarm provisions of NFPA 72.

[F] 907.7.2 Record of completion. A record of completion in accordance with NFPA 72 verifying that the system has been installed and tested in accordance with the *approved* plans and specifications shall be provided.

[F] 907.7.3 Instructions. Operating, testing and maintenance instructions and record drawings ("as-builts") and equipment specifications shall be provided at an *approved* location.

[F] 907.8 Inspection, testing and maintenance. The maintenance and testing schedules and procedures for fire alarm and fire detection systems shall be in accordance with Section 907.8 of the *International Fire Code*.

SECTION 908
EMERGENCY ALARM SYSTEMS

[F] 908.1 Group H occupancies. Emergency alarms for the detection and notification of an emergency condition in Group H occupancies shall be provided in accordance with Section 415.5.

[F] 908.2 Group H-5 occupancy. Emergency alarms for notification of an emergency condition in an HPM facility shall be provided as required in Section 415.11.3.5. *

SECTION 909
SMOKE CONTROL SYSTEMS

[F] 909.1 Scope and purpose. This section applies to mechanical or passive smoke control systems where they are required by other provisions of this code. The purpose of this section is to establish minimum requirements for the design, installation and acceptance testing of smoke control systems that are intended to provide a tenable environment for the evacuation or relocation of occupants. These provisions are not intended for the preservation of contents, the timely restoration of operations or for assistance in fire suppression or overhaul activities. Smoke control systems regulated by this section serve a different purpose than the smoke- and heat-removal provisions found in Section 910. Mechanical smoke control systems shall not be considered exhaust systems under Chapter 5 of the *International Mechanical Code*.

[S] 909.1.1 Smoke control presubmittal conference. The applicant shall arrange a smoke control presubmittal conference at least 60 days prior to submittal of a building permit application that contains the construction documents for any architectural components of the building. The purpose of this presubmittal conference is to obtain conceptual approval of the design team approach to compliance with the smoke control provisions in this section.

[F] 909.2 General design requirements. Buildings, structures or parts thereof required by this code to have a smoke control system or systems shall have such systems designed in accordance with the applicable requirements of Section 909 and the generally accepted and well-established principles of engineering relevant to the design. The *construction documents* shall include sufficient information and detail to adequately describe the elements of the design necessary for the proper implementation of the smoke control systems. These documents shall be accompanied by sufficient information and analysis to demonstrate compliance with these provisions.

[F] 909.3 Special inspection and test requirements. In addition to the ordinary inspection and test requirements that buildings, structures and parts thereof are required to undergo, smoke control systems subject to the provisions of Section 909 shall undergo *special inspections* and tests sufficient to verify the proper commissioning of the smoke control design in its final installed condition. The design submission accompanying the *construction documents* shall clearly detail procedures and methods to be used and the items subject to such inspections and tests. Such commissioning shall be in accordance with generally accepted engineering practice and, where possible, based on published standards for the particular testing involved. The special inspections and tests required by this section shall be conducted under the same terms in Section 1704.

[F] 909.4 Analysis. A rational analysis supporting the types of smoke control systems to be employed, their methods of operation, the systems supporting them and the methods of construction to be utilized shall accompany the submitted *construction documents* and shall include, but not be limited to, the items indicated in Sections 909.4.1 through 909.4.7.

[F] 909.4.1 Stack effect. The system shall be designed such that the maximum probable normal or reverse stack effect will not adversely interfere with the system's capabilities. In determining the maximum probable stack effect, altitude, elevation, weather history and interior temperatures shall be used.

[F] 909.4.2 Temperature effect of fire. Buoyancy and expansion caused by the design fire in accordance with Section 909.9 shall be analyzed. The system shall be designed such that these effects do not adversely interfere with the system's capabilities.

[F] 909.4.3 Wind effect. The design shall consider the adverse effects of wind. Such consideration shall be consistent with the wind-loading provisions of Chapter 16.

[F] 909.4.4 HVAC systems. The design shall consider the effects of the heating, ventilating and air-conditioning (HVAC) systems on both smoke and fire transport. The analysis shall include all permutations of systems status. The design shall consider the effects of the fire on the HVAC systems.

[F] 909.4.5 Climate. The design shall consider the effects of low temperatures on systems, property and occupants. Air inlets and exhausts shall be located so as to prevent snow or ice blockage.

[F] 909.4.6 Duration of operation. All portions of active or engineered smoke control systems shall be capable of continued operation after detection of the fire event for a period of not less than either 20 minutes or 1.5 times the calculated egress time, whichever is greater.

909.4.7 Smoke control system interaction. The design shall consider the interaction effects of the operation of multiple smoke control systems for all design scenarios.

[F] 909.5 Smoke barrier construction. *Smoke barriers* required for passive smoke control and a smoke control system using the pressurization method shall comply with Section 709. The maximum allowable leakage area shall be the aggregate area calculated using the following leakage area ratios:

1. Walls $A/A_w = 0.00100$
2. Interior *exit stairways* and *ramps* and *exit passageways*: $A/A_w = 0.00035$
3. Enclosed *exit access stairways* and *ramps* and all other shafts: $A/A_w = 0.00150$
4. Floors and roofs: $A/A_F = 0.00050$

where:

A = Total leakage area, square feet (m^2).

A_F = Unit floor or roof area of barrier, square feet (m^2).

A_w = Unit wall area of barrier, square feet (m^2).

The leakage area ratios shown do not include openings due to gaps around doors and operable windows. The total leakage area of the *smoke barrier* shall be determined in accordance with Section 909.5.1 and tested in accordance with Section 909.5.2.

[F] 909.5.1 Total leakage area. Total leakage area of the barrier is the product of the *smoke barrier* gross area multiplied by the allowable leakage area ratio, plus the area of other openings such as gaps around doors and operable windows.

[S][F] 909.5.2 Testing of leakage area. Compliance with the maximum total leakage area shall be determined by achieving the minimum air pressure difference across the barrier with the system in the smoke control mode for mechanical smoke control systems utilizing the pressurization method. Compliance with the maximum total leakage area of passive smoke control systems shall be verified through methods such as door fan testing or other methods, as *approved* by the ((~~fire code~~)) building official.

[F] 909.5.3 Opening protection. Openings in *smoke barriers* shall be protected by automatic-closing devices actuated by the required controls for the mechanical smoke control system. Door openings shall be protected by *fire door assemblies* complying with Section 716.

Exceptions:

1. Passive smoke control systems with automatic-closing devices actuated by spot-type smoke detectors *listed* for releasing service installed in accordance with Section 907.3.
2. Fixed openings between smoke zones that are protected utilizing the airflow method.
3. In Group I-1, Condition 2; Group I-2; and ambulatory care facilities, where a pair of opposite-swinging doors are installed across a corridor in accordance with Section 909.5.3.1, the doors shall not be required to be protected in accordance with Section 716. The doors shall be close-fitting within operational tolerances and shall not have a center mullion or undercuts in excess of 3/4 inch (19.1 mm), louvers or grilles. The doors shall have head and jamb stops and astragals or rabbets at meeting edges and, where permitted by the door manufacturer's listing, positive-latching devices are not required.
4. In Group I-2 and ambulatory care facilities, where such doors are special-purpose horizontal sliding, accordion or folding door assemblies installed in accordance with Section 1010.1.4.3 and are automatic closing by smoke detection in accordance with Section 716.2.6.5.
5. Group I-3.
6. Openings between smoke zones with clear ceiling heights of 14 feet (4267 mm) or greater and bank-down capacity of greater than 20 minutes as determined by the design fire size.

909.5.3.1 Group I-1, Condition 2; Group I-2; and ambulatory care facilities. In Group I-1, Condition 2; Group I-2; and *ambulatory care facilities*, where doors are installed across a *corridor*, the doors shall be automatic closing by smoke detection in accordance with Section 716.2.6.5 and shall have a vision panel with fire-protection-rated glazing materials in fire protection-rated frames, the area of which shall not exceed that tested.

[F] 909.5.3.2 Ducts and air transfer openings. Ducts and air transfer openings are required to be protected with a minimum Class II, 250°F (121°C) *smoke damper* complying with Section 717.

[F] 909.6 Pressurization method. The primary mechanical means of controlling smoke shall be by pressure differences across smoke barriers. Maintenance of a tenable environment is not required in the smoke control zone of fire origin.

[F] 909.6.1 Minimum pressure difference. The pressure difference across a *smoke barrier* used to separate smoke zones shall be not less than 0.05-inch water gage (0.0124 kPa) in fully sprinklered buildings.

In buildings permitted to be other than fully sprinklered, the smoke control system shall be designed to achieve pressure differences not less than two times the maximum calculated pressure difference produced by the design fire.

[F] 909.6.2 Maximum pressure difference. The maximum air pressure difference across a *smoke barrier* shall be determined by required door-opening or closing forces. The actual force required to open *exit* doors when the system is in the smoke control mode shall be in accordance with Section 1010.1.3. Opening and closing forces for other doors shall be determined by standard engineering methods for the resolution of forces and reactions. The calculated force to set a side-hinged, swinging door in motion shall be determined by:

$$F = F_{dc} + K(WA\Delta P)/2(W\text{-}d) \qquad \textbf{(Equation 9-1)}$$

where:

A = Door area, square feet (m^2).

d = Distance from door handle to latch edge of door, feet (m).

F = Total door opening force, pounds (N).

F_{dc} = Force required to overcome closing device, pounds (N).

K = Coefficient 5.2 (1.0).

W = Door width, feet (m).

ΔP = Design pressure difference, inches of water (Pa).

[S][F] 909.6.3 Pressurized stairways and elevator hoistways. Where stairways or elevator hoistways are pressurized, such pressurization systems shall comply with Section 909 as smoke control systems, in addition to the requirements of Sections 909.20 ((~~of this code~~)) and 909.21. ((~~of the *International Fire Code*.~~))

[S][F] 909.7 Airflow design method. Where *approved* by the ((~~fire code~~)) building official, smoke migration through openings fixed in a permanently open position, which are located between smoke control zones by the use of the airflow method, shall be permitted. The design airflow shall be in accordance with this section. Airflow shall be directed to limit smoke migration from the fire zone. The geometry of openings shall be considered to prevent flow reversal from turbulent effects. Smoke control systems using the airflow method shall be designed in accordance with NFPA 92.

[F] 909.7.1 Prohibited conditions. This method shall not be employed where either the quantity of air or the velocity of the airflow will adversely affect other portions of the smoke control system, unduly intensify the fire, disrupt plume dynamics or interfere with exiting. Airflow toward the fire shall not exceed 200 feet per minute (1.02 m/s). Where the calculated airflow exceeds this limit, the airflow method shall not be used.

[S][F] 909.8 Exhaust method. Where *approved* by the ((~~fire code~~)) building official, mechanical smoke control for large enclosed volumes, such as in atriums or malls, shall be permitted to utilize the exhaust method. Smoke control systems using the exhaust method shall be designed in accordance with NFPA 92.

[F] 909.8.1 Smoke layer. The height of the lowest horizontal surface of the smoke layer interface shall be maintained not less than 6 feet (1829 mm) above a walking surface that forms a portion of a required egress system within the smoke zone.

[S][F] 909.9 Design fire. The design fire shall be based on a rational analysis performed by the *registered design professional* and approved by the ((~~fire code~~)) building official. The design fire shall be based on the analysis in accordance with Section 909.4 and this section. A design fire is not required for stairway and elevator hoistway pressurization system designs.

[F] 909.9.1 Factors considered. The engineering analysis shall include the characteristics of the fuel, fuel load, effects included by the fire and whether the fire is likely to be steady or unsteady.

[F] 909.9.2 Design fire fuel. Determination of the design fire shall include consideration of the type of fuel, fuel spacing and configuration.

[F] 909.9.3 Heat-release assumptions. The analysis shall make use of best available data from *approved* sources and shall not be based on excessively stringent limitations of combustible material.

[F] 909.9.4 Sprinkler effectiveness assumptions. A documented engineering analysis shall be provided for conditions that assume fire growth is halted at the time of sprinkler activation.

[S][F] 909.10 Equipment. Equipment including, but not limited to, fans, ducts, automatic *dampers* and balance *dampers*, shall be ((~~suitable~~)) listed for its intended use, ((~~suitable~~)) listed for the probable exposure temperatures that the rational analysis indicates and as *approved* by the ((~~fire code~~)) building official.

[S][F] 909.10.1 Exhaust fans. Components of exhaust fans shall be rated and certified by the manufacturer for the probable temperature rise to which the components will be exposed.

Exception: An elevated temperature rating is not required for ventilation system fans used to assist in achieving stairway and elevator hoistway pressure differential relationships.

This temperature rise shall be computed by:

$$T_s = (Q_c/mc) + (T_a) \qquad \textbf{(Equation 9-2)}$$

where:

c = Specific heat of smoke at smoke layer temperature, Btu/lb°F (kJ/kg · K).

m = Exhaust rate, pounds per second (kg/s).

Q_c = Convective heat output of fire, Btu/s (kW).

T_a = Ambient temperature, °F (K).

T_s = Smoke temperature, °F (K).

Exception: Reduced T_s as calculated based on the assurance of adequate dilution air.

[S][F] 909.10.2 Ducts. Duct materials and joints shall be capable of withstanding the probable temperatures and pressures to which they are exposed as determined in accordance with Section 909.10.1. Ducts shall be constructed and supported in accordance with the *International Mechanical Code.* Ducts shall be leak tested to 1.5 times the maximum design pressure in accordance with nationally accepted practices. Measured leakage shall not exceed 5 percent of design flow. Results of such testing shall be a part of the documentation procedure. Ducts shall be supported directly from fire resistance-rated structural elements of the building by substantial, noncombustible supports.

Exceptions:

1. Duct leakage testing is not required for stairway or elevator hoistway pressurization systems.
2. Noncombustible supports are not required in low-rise buildings of combustible construction.
3. Flexible connections, for the purpose of vibration isolation, complying with the *International Mechanical Code* and that are constructed of *approved* fire-resistance-rated materials.

[S][F] 909.10.3 Equipment, inlets and outlets. Equipment shall be located so as to not expose uninvolved portions of the building to an additional fire hazard. Outside air inlets shall be located ((~~so~~)) as required by Sections 909.20.5 and 909.20.6, to minimize the potential for introducing smoke or flame into the building. Exhaust outlets shall be so located as to minimize reintroduction of smoke into the building and to limit exposure of the building or adjacent buildings to an additional fire hazard.

[F] 909.10.4 Automatic dampers. Automatic *dampers*, regardless of the purpose for which they are installed within the smoke control system, shall be *listed* and conform to the requirements of *approved*, recognized standards.

[S][F] 909.10.5 Fans. In addition to other requirements, belt-driven fans shall have 1.5 times the number of belts required for the design duty, with the minimum number of belts being two. Fans shall be selected for stable performance based on normal temperature and, where applicable, elevated temperature. Calculations and manufacturer's fan curves shall be part of the documentation procedures. Fans shall be supported and restrained by noncombustible devices in accordance with the requirements of Chapter 16.

Exceptions:

1. An elevated temperature rating is not required for stairway and elevator hoistway pressurization supply air fans or for ventilation system fans used to assist in achieving stairway and elevator hoistway pressure differential relationships.
2. Noncombustible supports are not required in low-rise buildings of combustible construction.

Motors driving fans shall not be operated beyond their nameplate horsepower (kilowatts), as determined from measurement of actual current draw, and shall have a minimum service factor of 1.15.

[S][F] 909.11 ((~~Standby~~)) Emergency power. Smoke control systems shall be provided with ((~~standby~~)) emergency power in accordance with Section 2702.

Exceptions:

1. Stairway pressurization systems for low-rise buildings are permitted to be provided with legally required standby power in accordance with Section 909.20.6.

2. Hoistway pressurization systems for low-rise buildings are permitted to be provided with legally required standby power in accordance with Section 909.21.5.

Interpretation I909.11: Other building ventilation system fans used to achieve stairway or elevator hoistway pressure differential relationships are considered to be part of the smoke control system and are required to be provided with emergency power in high-rise buildings.

909.11.1 Equipment room. The ((~~standby~~)) emergency power source and its transfer switches shall be in a room separate from the normal power transformers and switch gears and ventilated directly to and from the exterior. The room shall be enclosed with not less than 1-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both.

Exceptions:

1. Where located within a sprinklered parking garage of Type I or II construction, emergency power and *legally required standby power systems* with fixed fuel quantities meeting the limits of Section 603.3 of the International Fire Code, and their transfer switches, are not required to be in a separate room. Other occupancies located in the story where the system is located shall be separated from the system by fire barriers with a minimum 1 hour fire-resistance rating.
2. Combustion and radiator intake air are permitted to be transferred from the adjacent garage. Radiator discharge air is permitted to be transferred to the adjacent garage. Radiator ventilation intake and discharge air locations shall be separated to maintain the radiator ventilation intake air temperature below the maximum temperature allowed to meet the emergency and *legally required standby power system* loads.

[F] 909.11.2 Power sources and power surges. Elements of the smoke control system relying on volatile memories or the like shall be supplied with uninterruptable power sources of sufficient duration to span 15-minute primary power interruption. Elements of the smoke control system susceptible to power surges shall be suitably protected by conditioners, suppressors or other *approved* means.

909.11.3 Wiring. In addition to meeting requirements of the Seattle Electrical Code, all wiring, regardless of voltage, shall have fire-resistance-rated protection of at least two hours or as required in rules promulgated by the building official.

Exceptions:

1. Subject to the approval of the building official, fire-resistance rating is not required for wiring located in a parking garage.
2. Wiring serving building ventilation system fans used to achieve stairway or elevator hoistway pressure differential relationships need not be protected unless protection is required by other provisions in this or other codes.
3. Wiring serving stairway or elevator hoistway pressurization systems in low-rise buildings is permitted to have fire-resistance-rated protection consistent with the fire-resistance rating of the stairway or elevator hoistway.

[S][F] 909.12 Detection and control systems. Fire detection systems providing control input or output signals to mechanical smoke control systems or elements thereof shall comply with the requirements of Section 907. Such systems shall be equipped with a control unit complying with UL 864 and listed as smoke control equipment.

909.12.1 Verification. Control systems for mechanical smoke control systems shall include provisions for verification. Verification shall include positive confirmation of actuation, testing, manual override and the presence of power downstream of all disconnects. A preprogrammed weekly test sequence shall report abnormal conditions audibly, visually and by printed report. The preprogrammed weekly test shall operate all devices, equipment and components used for smoke control.

Exceptions:

1. Where verification of individual components tested through the preprogrammed weekly testing sequence will interfere with, and produce unwanted effects to, normal building operation, such individual components are permitted to be bypassed from the preprogrammed weekly testing, where *approved* by the building official and in accordance with both of the following:
   1.1. Where the operation of components is bypassed from the preprogrammed weekly test, presence of power downstream of all disconnects shall be verified weekly by a listed control unit.
   1.2. Testing of all components bypassed from the preprogrammed weekly test shall be in accordance with Section 909.20.6 of the *International Fire Code.*
2. Weekly testing is not required for stairway and hoistway pressurization systems.

[F] 909.12.2 Wiring. ((~~In addition to meeting requirements of NFPA 70, all wiring, regardless of voltage, shall be fully enclosed within continuous raceways.~~)) See Section 909.11.3.

[F] 909.12.3 Activation. Smoke control systems shall be activated in accordance with this section.

[F] 909.12.3.1 Pressurization, airflow or exhaust method. Mechanical smoke control systems using the pressurization, airflow or exhaust method shall have completely automatic control.

[F] 909.12.3.2 Passive method. Passive smoke control systems actuated by *approved* spot-type detectors *listed* for releasing service shall be permitted.

[F] 909.12.4 Automatic control. Where completely automatic control is required or used, the automatic-control sequences shall be initiated from an appropriately zoned *automatic sprinkler system* complying with Section 903.3.1.1, manual controls provided with *ready access* for the fire department and any smoke detectors required by engineering analysis.

[F] 909.13 Control air tubing. Control air tubing shall be of sufficient size to meet the required response times. Tubing shall be flushed clean and dry prior to final connections and shall be adequately supported and protected from damage. Tubing passing through concrete or masonry shall be sleeved and protected from abrasion and electrolytic action.

[F] 909.13.1 Materials. Control-air tubing shall be hard-drawn copper, Type L, ACR in accordance with ASTM B42, ASTM B43, ASTM B68, ASTM B88, ASTM B251 and ASTM B280. Fittings shall be wrought copper or brass, solder type in accordance with ASME B16.18 or ASME B16.22. Changes in direction shall be made with appropriate tool bends. Brass compression- type fittings shall be used at final connection to devices; other joints shall be brazed using a BCuP-5 brazing alloy with solidus above 1,100°F (593°C) and liquids below 1,500°F (816°C). Brazing flux shall be used on copper-to-brass joints only.

Exception: Nonmetallic tubing used within control panels and at the final connection to devices provided that all of the following conditions are met:

1. Tubing shall comply with the requirements of Section 602.2.1.3 of the *International Mechanical Code*.
2. Tubing and connected devices shall be completely enclosed within a galvanized or paint-grade steel enclosure having a minimum thickness of 0.0296 inch (0.7534 mm) (No. 22 gage). Entry to the enclosure shall be by copper tubing with a protective grommet of neoprene or Teflon or by suitable brass compression to male barbed adapter.
3. Tubing shall be identified by appropriately documented coding.
4. Tubing shall be neatly tied and supported within the enclosure. Tubing bridging cabinets and doors or moveable devices shall be of sufficient length to avoid tension and excessive stress. Tubing shall be protected against abrasion. Tubing connected to devices on doors shall be fastened along hinges.

[F] 909.13.2 Isolation from other functions. Control tubing serving other than smoke control functions shall be isolated by automatic isolation valves or shall be an independent system.

[F] 909.13.3 Testing. Control air tubing shall be tested at three times the operating pressure for not less than 30 minutes without any noticeable loss in gauge pressure prior to final connection to devices.

[F] 909.14 Marking and identification. The detection and control systems shall be clearly marked at all junctions, accesses and terminations.

[S][F] 909.15 Control diagrams. Identical control diagrams showing all devices in the system and identifying their location and function shall be maintained current and kept on file ((~~with the fire code official, the fire department and~~)) in the fire command center. ((~~in a format and manner *approved* by the *fire code official.*~~))

Exception: Control diagrams are not required for stairway or elevator hoistway pressurization systems in low-rise buildings.

[S][F] 909.16 Fire fighter's smoke control panel. A fire fighter's smoke control panel for fire department emergency response purposes only shall be provided and shall include manual control or override of automatic control for mechanical smoke control systems. The panel shall be located in a fire command center complying with Section 911 in high-rise buildings or buildings with smoke-protected assembly seating. In all other buildings, the fire fighter's smoke control panel shall be installed in an approved location adjacent to the fire alarm control panel. The fire fighter's smoke control panel shall comply with Sections 909.16.1 through 909.16.3. The smoke control panel for high rise buildings shall include a visual depiction of the building showing typical floor plan(s) with locations of interior exit stairways and elevator hoistways. The panel shall also include section views of the building to show the extent of travel for each interior exit stairway and elevator. Interior exit stairways and elevator hoistways shall be labeled on the plan section views to match the labeling used in the building itself.

Exception: For buildings that use only stairway and elevator hoistway pressurization for smoke control, pressurization fan status and controls in accordance with Section 909.16.2 (or equivalent) may be installed on the main fire alarm control panel (FACP) in lieu of installing a dedicated fire fighter's smoke control panel. The building graphics normally provided on the smoke control panel shall be laminated and mounted in the vicinity of the FACP for quick reference by emergency responders.

Note: This exception may be applied to ventilation systems other than interior exit stairway supply air systems to exhaust air from adjacent space.

[S][F] 909.16.1 Smoke control systems. Fans within the building shall be shown on the fire fighter's control panel. Fan control switches shall be located on the panel in the vicinity of the location where the shaft supplied by each fan is depicted. A

clear indication of the direction of airflow and the relationship of components shall be displayed. Status indicators shall be provided for all ((~~smoke control equipment, annunciated by fan and zone, and by pilot-lamp-type indicators~~)) fans as follows:

1. Fans ((~~, *dampers* and other operating equipment~~)) in ((~~their normal~~)) a ready/non-operating status—WHITE.
2. Fans ((~~, *dampers* and other operating equipment~~)) in their off ((~~or closed~~)) status—RED.
3. Fans ((~~, *dampers* and other operating equipment~~)) in ((~~their on or open status~~)) operation—GREEN.
4. Fans ((~~, *dampers* and other operating equipment~~)) in a fault ((~~status~~)) condition—YELLOW/AMBER.

[F] 909.16.2 Smoke control panel. The fire fighter's control panel shall provide control capability over the complete smoke control system equipment within the building as follows:

1. ON-AUTO-OFF control over each ((~~individual piece of operating smoke control equipment that can be controlled from other sources within the building~~)) shaft pressurization fan. ((~~This includes *stairway* pressurization fans; smoke exhaust fans; supply, return and exhaust fans; elevator shaft fans and other operating equipment used or intended for smoke control purposes.~~
2. ~~OPEN-AUTO-CLOSE control over individual dampers relating to smoke control and that are controlled from other sources within the building.~~))
2. AUTO-OFF-POSITIVE PRESSURE-NEGATIVE PRESSURE control over each smoke control zone designed with such features. Individual control of each damper and fan used to achieve the positive or negative pressure condition is not required.

((~~3. ON-OFF or OPEN-CLOSE control over smoke control and other critical equipment associated with a fire or smoke emergency and that can only be controlled from the fire fighter's control panel.~~))

3. AUTO-EXHAUST-OFF control over each smoke control zone using the exhaust method of smoke control.

Exceptions:

1. Complex systems, where *approved,* where the controls and indicators are combined to control and indicate all elements of a single smoke zone as a unit.
2. Complex systems, where *approved,* where the control is accomplished by computer interface using approved, plain English commands.

[F] 909.16.3 Control action and priorities. The fire-fighter's control panel actions shall be as follows:

1. ON-OFF and OPEN-CLOSE control actions shall have the highest priority of any control point within the building. Once issued from the fire fighter's control panel, automatic or manual control from any other control point within the building shall not contradict the control action. Where automatic means are provided to interrupt normal, nonemergency equipment operation or produce a specific result to safeguard the building or equipment including, but not limited to, duct freezestats, duct smoke detectors, high-temperature cutouts, temperature-actuated linkage and similar devices, such means shall be capable of being overridden by the fire fighter's control panel. The last control action as indicated by each fire fighter's control panel switch position shall prevail. Control actions shall not require the smoke control system to assume more than one configuration at any one time.

   Exception: Power disconnects required by ((~~NFPA 70~~)) the Seattle Electrical Code.

2. Only the AUTO position of each three-position fire-fighter's control panel switch shall allow automatic or manual control action from other control points within the building. The AUTO position shall be the NORMAL, nonemergency, building control position. Where a fire fighter's control panel is in the AUTO position, the actual status of the device (on, off, open, closed) shall continue to be indicated by the status indicator described in Section 909.16.1. Where directed by an automatic signal to assume an emergency condition, the NORMAL position shall become the emergency condition for that device or group of devices within the zone. Control actions shall not require the smoke control system to assume more than one configuration at any one time.

[F] 909.17 System response time. Smoke-control system activation shall be initiated immediately after receipt of an appropriate automatic or manual activation command. Smoke control systems shall activate individual components (such as *dampers* and fans) in the sequence necessary to prevent physical damage to the fans, *dampers,* ducts and other equipment. For purposes of smoke control, the fire fighter's control panel response time shall be the same for automatic or manual smoke control action initiated from any other building control point. The total response time, including that necessary for detection, shutdown of operating equipment and smoke control system startup, shall allow for full operational mode to be achieved before the conditions in the space exceed the design smoke condition. The system response time for each component and their sequential relationships shall be detailed in the required rational analysis and verification of their installed condition reported in the required final report.

[S][F] 909.18 Acceptance testing. Devices, equipment, components and sequences shall be individually tested. These tests, in addition to those required by other provisions of this code, or as required in rules promulgated by the building official, shall consist of determination of function, sequence and, where applicable, capacity of their installed condition.

[F] 909.18.1 Detection devices. Smoke or fire detectors that are a part of a smoke control system shall be tested in accordance with Chapter 9 in their installed condition. Where applicable, this testing shall include verification of airflow in both minimum and maximum conditions.

Note: Verification of airflow in stairway or elevator hoistway pressurization systems is only required to verify compliance with duct detector listing.

[S][F] 909.18.2 Ducts. Ducts that are part of a smoke control system shall be traversed using generally accepted practices to determine actual air quantities.

Exception: Ducts that are part of a stairway or elevator hoistway pressurization system need not be traversed.

[F] 909.18.3 Dampers. *Dampers* shall be tested for function in their installed condition.

[F] 909.18.4 Inlets and outlets. Inlets and outlets shall be read using generally accepted practices to determine air quantities.

Exception: Air quantities are not required to be determined for stairway or elevator hoistway pressurization systems unless specifically required by other sections in this code.

[F] 909.18.5 Fans. Fans shall be examined for correct rotation. Measurements of voltage, amperage, revolutions per minute (rpm) and belt tension shall be made.

[F] 909.18.6 Smoke barriers. Measurements using inclined manometers or other *approved* calibrated measuring devices shall be made of the pressure differences across *smoke barriers*. Such measurements shall be conducted for each possible smoke control condition.

[S][F] 909.18.7 Controls. Each smoke zone equipped with an automatic-initiation device shall be put into operation by the actuation of one such device. Each additional device within the zone shall be verified to cause the same sequence without requiring the operation of fan motors in order to prevent damage. Control sequences shall be verified throughout the system, including verification of override from the fire fighter's control panel and simulation of ((~~standby~~)) emergency power conditions.

[S][F] 909.18.8 Testing for smoke control. Smoke control systems shall be tested by a special inspector for compliance with the *approved* design in accordance with Section 1705.18.

[F] 909.18.8.1 Scope of testing. Testing shall be conducted ((~~in accordance with the following:~~)) prior to occupancy and after sufficient completion for the purposes of pressure-difference testing, flow measurements, and detection and control verification.

((~~1. During erection of ductwork and prior to concealment for the purposes of leakage testing and recording of device location.~~

~~2. Prior to occupancy and after sufficient completion for the purposes of pressure-difference testing, flow measurements, and detection and control verification.~~))

[F] 909.18.8.2 Qualifications. *Approved* agencies for smoke control testing shall have expertise in fire protection engineering, mechanical engineering and certification as air balancers.

[F] 909.18.8.3 Reports. A complete report of testing shall be prepared by the *approved* agency. The report shall include identification of all devices by manufacturer, nameplate data, design values, measured values and identification tag or mark. The report shall be reviewed by the responsible *registered design professional* and, when satisfied that the design intent has been achieved, the responsible *registered design professional* shall sign, seal and date the report.

[F] 909.18.8.3.1 Report filing. ((~~A copy~~)) Copies of the final report shall be filed with the building official and the fire code official. ((~~and an~~)) An identical copy shall be maintained in an *approved* location at the building and shall be made available to the fire department on request.

Exception: A copy of the final report need not be maintained at low-rise buildings using stairway or elevator hoistway pressurization.

[S] ((~~[F] 909.18.9 Identification and documentation.~~ ~~Charts, drawings and other documents identifying and locating each component of the smoke control system, and describing its proper function and maintenance requirements, shall be maintained on file at the building as an attachment to the report required by Section 909.18.8.3. Devices shall have an *approved* identifying tag or *mark* on them consistent with the other required documentation and shall be dated indicating the last time they were successfully tested and by whom.~~))

[S][F] 909.19 System acceptance. Buildings, or portions thereof, required by this code to comply with this section shall not be issued a certificate of occupancy until such time that the ((~~fire code~~)) *building official* determines that the provisions of this section have been fully met. ((~~complied with and that the fire department has received satisfactory instruction on the operation, both automatic and manual, of the system and a written maintenance program complying with the requirements of Section 909.20.1 of the *International Fire Code* has been submitted and approved by the fire code official.~~))

Exception: In buildings of phased construction, a temporary certificate of occupancy, as *approved* by the ((~~fire code~~)) *building official*, shall be allowed provided that those portions of the building to be occupied meet the requirements of this section and that the remainder does not pose a significant hazard to the safety of the proposed occupants or adjacent buildings.

Note: Seattle Fire Department requires a written maintenance program to be submitted to the *fire code official*, but this is not required as a condition of issuing a certificate of occupancy.

[S] 909.20 ((~~Smokeproof enclosures~~)) RESERVED. ((~~Where required by Section 1023.11, a smokeproof enclosure shall be constructed in accordance with this section. A smokeproof enclosure shall consist of an *interior exit stairway* or *ramp* that is enclosed in accordance with the applicable provisions of Section 1023 and an open exterior balcony or ventilated vestibule meeting the requirements of this section. Where access to the roof is required by the *International Fire Code*, such access shall be from the smokeproof enclosure where a smokeproof enclosure is required.~~))

909.20.1 ((~~Access~~)) RESERVED. ((~~Access to the *stairway* or *ramp* shall be by way of a vestibule or an open exterior balcony. The minimum dimension of the vestibule shall be not less than the required width of the *corridor* leading to the vestibule but shall not have a width of less than 44 inches (1118 mm) and shall not have a length of less than 72 inches (1829 mm) in the direction of egress travel.~~))

909.20.2 ((~~Construction~~)) RESERVED. ((~~The smokeproof enclosure shall be separated from the remainder of the building by not less than 2-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. Openings are not permitted other than the required *means of egress* doors. The vestibule shall be separated from the *stairway* or *ramp* by not less than 2-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. The open exterior balcony shall be constructed in accordance with the *fire-resistance rating* requirements for floor assemblies.~~

~~909.20.2.1 Door closers.~~ ~~Doors in a smokeproof enclosure shall be self- or automatic-closing by actuation of a smoke detector in accordance with Section 716.2.6.6 and shall be installed at the floor-side entrance to the smokeproof enclosure. The actuation of the smoke detector on any door shall activate the closing devices on all doors in the smokeproof enclosure at all levels. Smoke detectors shall be installed in accordance with Section 907.3.~~))

909.20.3 ((~~Natural ventilation alternative~~)) RESERVED. ((~~The provisions of Sections 909.20.3.1 through 909.20.3.3 shall apply to ventilation of smokeproof enclosures by natural means.~~

~~909.20.3.1 Balcony doors.~~ ~~Where access to the *stairway* or *ramp* is by way of an open exterior balcony, the door assembly into the enclosure shall be a *fire door assembly* in accordance with Section 716.~~

~~909.20.3.2 Vestibule doors.~~ ~~Where access to the *stairway* or *ramp* is by way of a vestibule, the door assembly into the vestibule shall be a *fire door assembly* complying with Section 716. The door assembly from the vestibule to the *stairway* shall have not less than a 20-minute *fire protection rating* complying with Section 716.~~

~~909.20.3.3 Vestibule ventilation.~~ ~~Each vestibule shall have a minimum net area of 16 square feet (1.5 m^2) of opening in a wall facing an outer *court*, *yard* or *public way* that is not less than 20 feet (6096 mm) in width.~~))

909.20.4 ((~~Mechanical ventilation alternative~~)) RESERVED. ((~~The provisions of Sections 909.20.4.1 through 909.20.4.4 shall apply to ventilation of smokeproof enclosures by mechanical means.~~

~~909.20.4.1 Vestibule doors.~~ ~~The door assembly from the building into the vestibule shall be a *fire door assembly* complying with Section 716.2.2.1. The door assembly from the vestibule to the *stairway* or *ramp* shall not have less than a 20-minute *fire protection rating* and shall meet the requirements for a smoke door assembly in accordance with Section 716.2.2.1. The door shall be installed in accordance with NFPA 105.~~

~~909.20.4.2 Vestibule ventilation.~~ ~~The vestibule shall be supplied with not less than one air change per minute and the exhaust shall be not less than 150 percent of supply. Supply air shall enter and exhaust air shall discharge from the vestibule through separate, tightly constructed ducts used only for that purpose. Supply air shall enter the vestibule within 6 inches (152 mm) of the floor level. The top of the exhaust register shall be located at the top of the smoke trap but not more than 6 inches (152 mm) down from the top of the trap, and shall be entirely within the smoke trap area. Doors in the open position shall not obstruct duct openings. Duct openings with controlling *dampers* are permitted where necessary to meet the design requirements, but *dampers* are not otherwise required.~~

~~909.20.4.2.1 Engineered ventilation system.~~ ~~Where a specially engineered system is used, the system shall exhaust a quantity of air equal to not less than 90 air changes per hour from any vestibule in the emergency operation mode and shall be sized to handle three vestibules simultaneously. Smoke detectors shall be located at the floor-side entrance to each vestibule and shall activate the system for the affected vestibule. Smoke detectors shall be installed in accordance with Section 907.3.~~

~~909.20.4.3 Smoke trap.~~ ~~The vestibule ceiling shall be not less than 20 inches (508 mm) higher than the door opening into the vestibule to serve as a smoke and heat trap and to provide an upward-moving air column. The height shall not be decreased unless *approved* and justified by design and test.~~

~~**909.20.4.4 Stairway or ramp shaft air movement system.** The *stairway* or *ramp* shaft shall be provided with a dampered relief opening and supplied with sufficient air to maintain a minimum positive pressure of 0.10 inch of water (25 Pa) in the shaft relative to the vestibule with all doors closed.~~))

[S] 909.20.5 Stairway and ramp pressurization ((~~alternative~~)) for high-rise and underground buildings. Where ((~~the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, the vestibule is not required, provided, that~~)) required by Section 403.5.4 or 405.7.2, each interior *exit stairway* or *ramp* ((~~is~~)) shall be pressurized to not less than 0.10 inch of water (25 Pa) and not more than 0.35 inches of water (87 Pa) in the shaft relative to the building measured with all *interior exit stairway* and *ramp* doors closed under maximum anticipated conditions of stack effect and wind effect. The pressure differential shall be measured between the *interior exit stairway* and the adjacent area. In residential buildings, the pressure differential is permitted to be measured between the *interior exit stairway* and the *dwelling units*.

Exceptions:

1. Positive pressure with respect to the elevator recall floor is required where elevator cars are at the floor of recall with the elevator doors open, but need not comply with the 0.10 inch of water minimum pressure differential.
2. The pressure differential is permitted to be measured relative to outdoor atmosphere on floors other than the following:
   - 2.1. The fire floor;
   - 2.2. The two floors immediately below the fire floor; and
   - 2.3. The floor immediately above the fire floor.

Interpretation I909.20.5: For the purposes of measuring pressure differentials, smoke zones consisting of floors interconnected by unenclosed vertical openings shall constitute a single floor.

909.20.5.1 Supply air. Air for stairway pressurization shall be supplied at intervals sufficient to maintain the required pressure throughout the interior exit stairway.

Note: The performance goal for Section 909.20.5.1 is compliance with minimum and maximum pressures at all levels of the shaft.

909.20.5.2 Supply air. Supply air shall be taken directly from an outside, uncontaminated source at least 20 feet (6096 mm) from any mechanical exhaust outlet and the dampered relief opening required by Section 909.20.5.3. The supply air intake shall be located at the exterior of the building. The intake shall be continuous to the exterior of the building. The fan system shall be equipped with two smoke detectors located in accordance with NFPA 72 arranged to automatically shut down the fan system only when both smoke detectors activate. The detectors shall be located downstream of the fan and shall be connected to the fire alarm as a supervisory signal.

Exception: The supply air intake need not be located 20 feet from the dampered relief outlet serving the same stairway.

Dampers other than motorized dampers required by the *International Energy Conservation Code* are not permitted in the stairway pressurization system air supply unless *approved* by the *building official*.

909.20.5.3 Dampered relief opening. The interior exit stairway shall be equipped with a relief opening at the top. The relief opening shall be equipped with a barometric relief damper and a motorized damper that complies with the *International Energy Conservation Code*. The motorized damper shall be of the normally open type (open with the power off). Activation of the damper shall be initiated by the building fire alarm system and by actuation of the *automatic sprinkler system*.

The pressurization system shall be capable of maintaining the differential pressure required by Section 909.20.5 while discharging 2,500 cubic feet per minute (1180 L/s) of air through the relief opening.

The relief outlet shall be located at least 20 feet from elevator hoistway and stairway pressurization system supply air intake locations.

Exception: The relief outlet need not be located 20 feet from the supply air intake for the stairway served by the relief outlet.

((~~909.20.6~~)) 909.20.5.4 ((~~Ventilating~~)) Activation of pressurization equipment. ((~~The activation of ventilating equipment required by the alternatives in Sections 909.20.4 and 909.20.5 shall be by smoke detectors installed at each floor level at an *approved* location at the entrance to the smokeproof enclosure. When the closing device for the *stairway* and *ramp* shaft and vestibule doors is activated by smoke detection or power failure, the mechanical equipment shall activate and operate at the required performance levels.~~)) The pressurization equipment required by Section 909.20.5 shall be activated by a fire alarm signal originating anywhere in the building. Smoke detectors shall be installed in accordance with Section 907.3. Activation of the pressurization equipment shall be independent of the position of any dampers in the stairway pressurization air supply system.

((~~909.20.6.1~~)) 909.20.5.5 ((~~Ventilation~~)) Independence of pressurization systems. ((~~Smokeproof enclosure ventilation~~)) Stairway pressurization systems shall be independent of other building ventilation systems.

Exception: Building ventilation systems, other than interior exit stairway supply air systems, are permitted to be used to exhaust air from adjacent space where necessary to maintain the differential pressure relationships. Building ventilation systems used to achieve stairway pressurization are not required to comply with Sections 909.10.1 and 909.11.3.

909.20.5.6 Protection of equipment. The equipment, control wiring, power wiring and ductwork shall comply with one of the following:

1. Equipment, control wiring, power wiring and ductwork shall be located exterior to the building and directly connected to the ((~~smokeproof enclosure~~)) interior exit stairway or connected to the ((~~smokeproof enclosure~~)) interior exit stairway by ductwork enclosed by ((~~not less than 2-hour~~)) *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both.
2. Equipment, control wiring, power wiring and ductwork shall be located within the ((~~smokeproof enclosure~~)) interior exit stairway with intake or exhaust directly from and to the outside or through ductwork enclosed by not less than 2-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both.
3. Equipment, control wiring, power wiring and ductwork shall be located within the building if separated from the remainder of the building, including other mechanical equipment, by not less than 2-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both.

Exceptions:

1. Control wiring and power wiring located outside of a 2-hour fire barrier construction shall be protected using any one of the following methods:
   1.1. Cables used for survivability of required critical circuits shall be listed in accordance with UL 2196 and shall have a fire-resistance rating of not less than 2 hours.
   1.2. Where encased with not less than 2 inches (51 mm) of concrete.
   1.3. Electrical circuit protective systems shall have a fire-resistance rating of not less than 2 hours. Electrical circuit protective systems shall be installed in accordance with their listing requirements.
2. Equipment, control wiring, power wiring, and ductwork serving building ventilation systems other than interior exit stairway supply air systems used to achieve the differential pressure relationships need not be protected.

((~~909.20.6.2~~)) 909.20.5.7 ((~~Standby~~)) Emergency power. ((~~Mechanical vestibule and *stairway* and *ramp* shaft ventilation~~)) Pressurization systems and automatic fire detection systems shall be provided with ((~~standby~~)) emergency power in accordance with Section 2702.

Interpretation I909.20.5.7: Building ventilation system fans used to achieve pressure differential relationships are considered to be part of the pressurization system and are required to be provided with emergency power.

((~~**909.20.6.3 Acceptance and testing.** Before the mechanical equipment is *approved*, the system shall be tested in the presence of the *building official* to confirm that the system is operating in compliance with these requirements.~~))

909.20.6 Stairway pressurization for low-rise buildings. Where stairway pressurization is provided in accordance with Section 1006.3.3 item 7 or Section 510.2 item 10, the pressurization system shall comply with the following:

1. Stairways shall be pressurized to a minimum positive pressure of 0.15 inch of water column (37 Pa) relative to the main occupied area on each floor, and a maximum pressure that complies with Section 1010.1.3.

Interpretation I909.20.6: For the purposes of measuring pressure differentials, smoke zones consisting of floors interconnected by unenclosed vertical openings shall constitute a single floor.

2. The stairway pressurization shall be activated by a fire alarm originating anywhere in the building.
3. Pressurization equipment and its duct work located within the building shall be separated from other portions of the building by construction equal to that required for the interior exit stairway.
4. Supply air shall be taken directly from an outside, uncontaminated source at least 20 feet (6096 mm) from any air exhaust system or outlet. Air ducts shall be continuous to the exterior of the building. Two smoke detectors shall be located in the duct in accordance with NFPA 72 arranged to automatically shut down the fan system only when both smoke detectors activate. The detectors shall be located downstream of the fan and shall be connected to the fire alarm as a supervisory signal.

5. A *legally required standby power system* shall be provided for the pressurization system according to Seattle Electrical Code Section 701. A connection ahead of the service disconnecting means shall be permitted as the sole source of power to the pressurization system.
6. Other measures to prevent loss of pressurization shall be provided in the design and construction of interior exit stairways, such as doors and door closers, quality of workmanship and caulking of penetrations and joints.
7. Stairway pressurization systems in low-rise buildings shall comply with Sections 909.2, 909.3, 909.10, 909.12, 909.13, 909.14, 909.17, 909.18, and 909.19 in addition to Section 909.20.6.

Note: A rational analysis complying with Section 909.4 is not required.

[S] 909.21 Elevator hoistway pressurization alternative. Where elevator hoistway pressurization is provided in lieu of required enclosed elevator lobbies, the pressurization system shall comply with Sections 909.21.1 through ((~~909.21.11~~)) 909.21.7.

909.21.1 Pressurization requirements. Elevator hoistways shall be pressurized to maintain a minimum positive pressure of 0.10 inch of water (25 Pa) and a maximum positive pressure of 0.25 inch of water (67 Pa) with respect to adjacent occupied space on all floors. This pressure shall be measured at the midpoint of each hoistway door, with all elevator cars at the floor of recall and all hoistway doors on the floor of recall open and all other hoistway doors closed. The pressure differentials shall be measured between the hoistway and the adjacent elevator landing. The opening and closing of hoistway doors at each level must be demonstrated during this test. ((~~The supply air intake shall be from an outside, uncontaminated source located a minimum distance of 20 feet (6096 mm) from any air exhaust system or outlet.~~))

Exceptions:

1. On floors containing only Group R occupancies, the pressure differential is permitted to be measured between the hoistway and a *dwelling unit* or *sleeping unit.*
2. Where an elevator opens into a lobby enclosed in accordance with Section ((~~3007.6 or 3008.6~~)) 403.6.1.5 or 403.6.2.6, the pressure differential is permitted to be measured between the hoistway and the space immediately outside the door(s) from the floor to the enclosed lobby.
3. The pressure differential is permitted to be measured relative to the outdoor atmosphere on floors other than the following:
   3.1. The fire floor.
   3.2. The two floors immediately below the fire floor.
   3.3. The floor immediately above the fire floor.
4. The minimum positive pressure of 0.10 inch of water (25 Pa) and a maximum positive pressure of 0.25 inch of water (67 Pa) with respect to occupied floors are not required at the floor of recall with the doors open.
5. Subject to the approval of the *building official*, pressurization is not required for elevators in high-rise buildings with less than 75 feet (22 860 mm) from the lowest floor to the highest ceiling of the *stories* served by the elevator.
6. Maximum and minimum pressures are permitted to comply with rules promulgated by the *building official.*

Interpretation I909.21: For the purposes of measuring pressure differentials, smoke zones consisting of floors interconnected by unenclosed vertical openings shall constitute a single floor.

909.21.1.1 Supply air. The supply air shall be taken from an outside, uncontaminated source located a minimum distance of 20 feet (6096 mm) from any mechanical exhaust outlet and dampered relief openings required by Section 909.20.5.3. The supply air intake may be located within the building provided it is located no more than 20 feet (6096 mm) from major openings in the building exterior such as loading docks and vehicular entrances. There shall be no obstruction to the flow of air to the intake.

Dampers other than motorized dampers required by the *International Energy Conservation Code* are not permitted in the elevator hoistway pressurization system air supply unless *approved* by the *building official.*

((~~909.21.1.1~~)) 909.21.1.2 Use of ventilation systems. Ventilation systems, other than hoistway supply air systems, are permitted to be used to exhaust air from adjacent spaces ((~~on the fire floor, two floors immediately below and one floor immediately above the fire floor~~)) to the building's exterior where necessary to maintain positive pressure relationships as required in Section 909.21.1 during operation of the elevator shaft pressurization system. Ventilation systems used to achieve elevator hoistway pressurization are not required to comply with Section 909.21.4 and 909.21.5.

909.21.2 Rational analysis. A rational analysis complying with Section 909.4 shall be submitted with the *construction documents.*

Exception: A rational analysis is not required for elevator hoistway pressurization in low-rise buildings.

909.21.3 Ducts for system. Any duct system that is part of the pressurization system shall be protected with the same *fire-resistance rating* as required for the elevator shaft enclosure.

909.21.4 Fan system. The fan system provided for the pressurization system shall be as required by Sections 909.21.4.1 through 909.21.4.4.

909.21.4.1 Fire resistance. Where located within the building, the fan system that provides the pressurization shall be protected with the same *fire-resistance rating* required for the elevator ((~~shaft~~)) hoistway enclosure.

909.21.4.2 Smoke detection. The fan system shall be equipped with ((~~a~~)) two smoke detectors ((~~that will~~)) located in accordance with NFPA 72 arranged to automatically shut down the fan system only when both smoke detectors activate. ((~~is detected within the system.~~)) The detectors shall be located downstream of the fan and shall be connected to the fire alarm as a supervisory signal.

909.21.4.3 Separate systems. A separate fan system shall be used for each elevator hoistway.

909.21.4.4 Fan capacity. The ((~~supply~~)) fan system shall be ((~~either adjustable with a capacity of not less than 1,000 cfm (0.4719 m^3/s) per door, or that specified by a *registered design professional* to meet the requirements of a designed pressurization system~~)) provided with the capacity to pressurize the elevator hoistway as determined by a registered design professional. The fan system shall be provided with a means to balance or modulate the airflow to the elevator hoistway to meet the differential pressure requirements on all floors for each condition identified by the rational analysis.

909.21.5 ((~~Standby~~)) Legally required standby and emergency power. Pressurization systems shall be powered by an *approved* emergency or *legally required standby power system*. ((~~The~~)) An *emergency power system* conforming to Section 909.11 shall be provided for pressurization systems in high-rise and underground buildings. Legally required standby power shall be provided ((~~with~~)) for the pressurization system in all other buildings. The emergency and legally required standby power shall be in accordance with Section 2702. For other than high-rise or underground buildings, connection ahead of the service disconnecting means in accordance with Seattle Electrical Code Section 701.12(E) is permitted as a source of legally required standby power.

909.21.6 Activation of pressurization system. The elevator pressurization system shall be activated upon activation of either the building fire alarm system or the elevator lobby smoke detectors. Where both a building fire alarm system and elevator lobby smoke detectors are present, each shall be independently capable of activating the pressurization system. Activation of the fan serving the hoistway is permitted to be delayed by up to 30 seconds so that elevator recall can be initiated prior to pressurizing the hoistway. Activation of the pressurization equipment shall be independent of the position of any dampers in the elevator hoistway air supply system.

Note: Activation of fans serving occupant evacuation elevators is allowed to be delayed, but the elevators must begin occupant evacuation activities and may not be immediately recalled.

((~~**909.21.7 Testing.** Testing for performance shall be required in accordance with Section 909.18.8. System acceptance shall be in accordance with Section 909.19.~~))

909.21.7 Machine and control rooms. Elevator machine and control rooms shall be pressurized in accordance with this section unless separated from the elevator hoistway by construction in accordance with Section 713.

((~~**909.21.8 Marking and identification.** Detection and control systems shall be marked in accordance with Section 909.14.~~

~~**909.21.9 Control diagrams.** Control diagrams shall be provided in accordance with Section 909.15.~~

~~**909.21.10 Control panel.** A control panel complying with Section 909.16 shall be provided.~~

~~**909.21.11 System response time.** Hoistway pressurization systems shall comply with the requirements for smoke control system response time in Section 909.17.~~))

SECTION 910
SMOKE AND HEAT REMOVAL

[F] 910.1 General. Where required by this code, smoke and heat vents or mechanical smoke removal systems shall conform to the requirements of this section.

[F] 910.2 Where required. Smoke and heat vents or a mechanical smoke removal system shall be installed as required by Sections 910.2.1 and 910.2.2.

Exceptions:

1. Frozen food warehouses used solely for storage of Class I and II commodities where protected by an *approved automatic sprinkler system*.
2. Smoke and heat removal shall not be required in areas of buildings equipped with early suppression fast-response (ESFR) sprinklers.

910.4.5 Manual control location. Manual controls shall be located where they are able to be accessed by the fire service from an exterior door of the building and separated from the remainder of the building by not less than 1-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both.

[F] 910.4.6 Control wiring. Wiring for operation and control of mechanical smoke removal systems shall be connected ahead of the main disconnect in accordance with Section 701.12E of ((~~NFPA 70~~)) the Seattle Electrical Code and be protected against interior fire exposure to temperatures in excess of 1,000°F (538°C) for a period of not less than 15 minutes.

[F] 910.4.7 Controls. Where building air-handling and mechanical smoke removal systems are combined or where independent building air-handling systems are provided, fans shall automatically shut down in accordance with the *International Mechanical Code*. The manual controls provided for the smoke removal system shall have the capability to override the automatic shutdown of fans that are part of the smoke removal system.

910.5 Maintenance. Smoke and heat vents and mechanical smoke removal systems shall be maintained in accordance with the *International Fire Code*.

SECTION 911
FIRE COMMAND CENTER

[S][F] 911.1 General. Where required by other sections of this code and in buildings classified as high-rise buildings by this code, a fire command center for fire department operations shall be provided and shall comply with Sections 911.1.1 through 911.1.6.

[F] 911.1.1 Location and access. The location and accessibility of the fire command center shall be *approved* by the *fire code official.*

[F] 911.1.2 Separation. The fire command center shall be separated from the remainder of the building by not less than a ((~~1~~)) 2-hour *fire barrier* constructed in accordance with Section 707 or *horizontal assembly* constructed in accordance with Section 711, or both.

[F] 911.1.3 Size. The *fire command center* shall be not less than 0.015 percent of the total building area of the facility served or 200 square feet (19 m^2) in area, whichever is greater, with a minimum dimension of 0.7 times the square root of the room area or 10 feet (3048 mm), whichever is greater.

[F] 911.1.4 Layout approval. A layout of the fire command center and all features required by this section to be contained therein shall be submitted for approval prior to installation.

[F] 911.1.5 Storage. Storage unrelated to operation of the fire command center shall be prohibited.

[F] 911.1.6 Required features. The fire command center shall comply with NFPA 72 and shall contain all of the following features:

1. The emergency voice/alarm communication system control unit.
2. The fire department communications system.
3. Fire detection and alarm system annunciator.
4. Annunciator unit visually indicating the location of the elevators and whether they are operational.
5. Status indicators and controls for air distribution systems.
6. The fire fighter's control panel required by Section 909.16 for smoke control systems installed in the building.
7. Controls for unlocking *interior exit stairway* doors simultaneously.
8. Sprinkler valve and waterflow detector display panels.
9. Emergency and legally required standby power status indicators.
10. A telephone for fire department use with controlled access to the public telephone system.
11. Fire pump status indicators.
12. Schematic building plans indicating the typical floor plan and detailing the building core, *means of egress*, fire protection systems, fire fighter air replenishment system, fire-fighting equipment and fire department access and the location of *fire walls, fire barriers, fire partitions, smoke barriers* and smoke partitions.
13. An *approved* Building Information Card that contains, but is not limited to, the following information:
    - 13.1. General building information that includes: property name, address, the number of floors in the building above and below grade, use and occupancy classification (for mixed uses, identify the different types of occupancies on each floor), and the estimated building population during the day, night and weekend.

13.2. Building emergency contact information that includes: a list of the building's emergency contacts including but not limited to building manager and building engineer and their respective work phone number, cell phone number, e-mail address.

13.3. Building construction information that includes: the type of building construction including but not limited to floors, walls, columns, and roof assembly.

13.4. *Exit access* and *exit stairway* information that includes: number of *exit access* and *exit stairways* in the building, each *exit access* and *exit stairway* designation and floors served, location where each *exit access* and *exit stairway* discharges, *interior exit stairways* that are pressurized, *exit* stairways provided with emergency lighting, each *exit stairway* that allows reentry, *exit stairways* providing roof access; elevator information that includes: number of elevator banks, elevator bank designation, elevator car numbers and respective floors that they serve; location of elevator machine rooms, control rooms and control spaces; location of sky lobby, location of freight elevator banks.

13.5. Building services and system information that includes: location of mechanical rooms, location of building management system, location and capacity of all fuel oil tanks, location of emergency generator, location of natural gas service.

13.6. Fire protection system information that includes: location of standpipes, location of fire pump room, location of fire department connections, floors protected by automatic sprinklers, location of different types of *automatic sprinkler systems* installed including, but not limited to, dry, wet and pre-action.

13.7 Hazardous material information that includes: location of hazardous material, quantity of hazardous material.

14. Work table.

15. Generator supervision devices, manual start and ((~~transfer~~)) stop features.

16. Public address system, where specifically required by other sections of this code.

17. Elevator fire recall switch in accordance with ASME A17.1/BSA 44.

18. Elevator emergency or legally required standby power selector switch(es), where emergency or standby power is provided.

19. On-site fire protection water tank fill-valve control switch, tank level indicators, tank low-level alarm and tank fill signal.

SECTION 912
FIRE DEPARTMENT CONNECTIONS

[F] 912.1 Installation. Fire department connections shall be installed in accordance with the NFPA standard applicable to the system design and shall comply with Sections 912.2 through 912.6.

[F] 912.2 Location. With respect to hydrants, driveways, buildings and landscaping, fire department connections shall be so located that fire apparatus and hose connected to supply the system will not obstruct access to the buildings for other fire apparatus. The location of fire department connections shall be *approved* by the *fire code official*.

[F] 912.2.1 Visible location. Fire department connections shall be located on the street side of buildings or facing approved fire apparatus access roads, fully visible and recognizable from the street, fire apparatus access road or nearest point of fire department vehicle access or as otherwise *approved* by the *fire code official*.

[F] 912.2.2 Existing buildings. On existing buildings, wherever the fire department connection is not visible to approaching fire apparatus, the fire department connection shall be indicated by an *approved* sign mounted on the street front or on the side of the building. Such sign shall have the letters "FDC" not less than 6 inches (152 mm) high and words in letters not less than 2 inches (51 mm) high or an arrow to indicate the location. Such signs shall be subject to the approval of the *fire code official*.

[F] 912.3 Fire hose threads. Fire hose threads used in connection with standpipe systems shall be *approved* and shall be compatible with fire department hose threads.

[F] 912.4 Access. Immediate access to fire department connections shall be maintained at all times and without obstruction by fences, bushes, trees, walls or any other fixed or moveable object. Access to fire department connections shall be *approved* by the *fire code official*.

Exception: Fences, where provided with an access gate equipped with a sign complying with the legend requirements of this section and a means of emergency operation. The gate and the means of emergency operation shall be *approved* by the *fire code official* and maintained operational at all times.

[F] 912.4.1 Locking fire department connection caps. The fire code official is authorized to require locking caps on fire department connections for water-based *fire protection systems* where the responding fire department carries appropriate key wrenches for removal.

[F] 912.4.2 Clear space around connections. A working space of not less than 36 inches (762 mm) in width, 36 inches (914 mm) in depth and 78 inches (1981 mm) in height shall be provided and maintained in front of and to the sides of wall-mounted fire department connections and around the circumference of free-standing fire department connections, except as otherwise required or *approved* by the *fire code official*.

[F] 912.4.3 Physical protection. Where fire department connections are subject to impact by a motor vehicle, vehicle impact protection shall be provided in accordance with Section 312 of the *International Fire Code.*

[S][F] 912.5 Signs. A metal sign with raised letters not less than 1 inch (25 mm) in size shall be mounted on all fire department connections serving automatic sprinklers, standpipes or fire pump connections. Such signs shall read: AUTOMATIC SPRINKLERS or STANDPIPES or TEST CONNECTION or a combination thereof as applicable. Where the fire department connection does not serve the entire building, a sign shall be provided indicating the portions of the building served.

912.5.1 Signs for high-rise buildings. An additional sign with letters at least 1 inch in size shall be provided at the fire department connections of high-rise buildings that indicate the building fire pump static (churn) discharge pressure. Where the pump is more than two *stories* above or below the fire department connections, the pump static/churn discharge pressure on the signage shall be adjusted to correct for the elevation difference.

[S][P] 912.6 Backflow protection. The potable water supply to automatic sprinkler and standpipe systems shall be protected against backflow as required by the ((~~*International*~~)) *Uniform Plumbing Code*.

SECTION 913
FIRE PUMPS

[F] 913.1 General. Where provided, fire pumps shall be installed in accordance with this section and NFPA 20.

[F] 913.2 Protection against interruption of service. The fire pump, driver and controller shall be protected in accordance with NFPA 20 against possible interruption of service through damage caused by explosion, fire, flood, earthquake, rodents, insects, windstorm, freezing, vandalism and other adverse conditions.

[W][S] 913.2.1 Protection of fire pump rooms. Fire pumps shall be located in rooms that are separated from all other areas of the building by 2-hour *fire barriers* constructed in accordance with Section 707 or 2-hour *horizontal assemblies* constructed in accordance with Section 711, or both. Fire pump rooms not directly accessible from the outside shall be accessible through an enclosed passageway from an interior exit stairway or exterior exit. The enclosed passageway shall have a *fire-resistance rating* not less than the *fire-resistance rating* of the fire pump room (see NFPA 20 Section 4.12.2.1.2).

((~~**Exceptions:**~~

1. ~~In other than high-rise buildings, separation by 1-hour *fire barriers* constructed in accordance with Section 707 or 1-hour *horizontal assemblies* constructed in accordance with Section 711, or both, shall be permitted in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.~~
2. ~~Separation is not required for fire pumps physically separated in accordance with NFPA 20.~~))

[F] 913.2.2 Circuits supplying fire pumps. Cables used for survivability of circuits supplying fire pumps shall be protected using one of the following methods:

1. Cables used for survivability of required critical circuits shall be *listed* in accordance with UL 2196 and shall have a f*ire-resistance rating* of not less than 1 hour.
2. Electrical circuit protective systems shall have a *fire-resistance rating* of not less than 1 hour. Electrical circuit protective systems shall be installed in accordance with their listing requirements.
3. Construction having a *fire-resistance rating* of not less than 1 hour.

[F] 913.3 Temperature of pump room. Suitable means shall be provided for maintaining the temperature of a pump room or pump house, where required, above 40°F (5°C).

[F] 913.3.1 Engine manufacturer's recommendation. Temperature of the pump room, pump house or area where engines are installed shall never be less than the minimum recommended by the engine manufacturer. The engine manufacturer's recommendations for oil heaters shall be followed.

[F] 913.4 Valve supervision. Where provided, the fire pump suction, discharge and bypass valves, and isolation valves on the backflow prevention device or assembly shall be supervised open by one of the following methods:

1. Central-station, proprietary or remote-station signaling service.
2. Local signaling service that will cause the sounding of an audible signal at a *constantly attended location*.

3. Locking valves open.
4. Sealing of valves and *approved* weekly recorded inspection where valves are located within fenced enclosures under the control of the owner.

[F] 913.4.1 Test outlet valve supervision. Fire pump test outlet valves shall be supervised in the closed position.

[F] 913.5 Acceptance test. Acceptance testing shall be done in accordance with the requirements of NFPA 20.

SECTION 914
EMERGENCY RESPONDER SAFETY FEATURES

[F] 914.1 Shaftway markings. Vertical shafts shall be identified as required by Sections 914.1.1 and 914.1.2.

[F] 914.1.1 Exterior access to shaftways. Outside openings accessible to the fire department and that open directly on a hoistway or shaftway communicating between two or more floors in a building shall be plainly marked with the word "SHAFTWAY" in red letters not less than 6 inches (152 mm) high on a white background. Such warning signs shall be placed so as to be readily discernible from the outside of the building.

[F] 914.1.2 Interior access to shaftways. Door or window openings to a hoistway or shaftway from the interior of the building shall be plainly marked with the word "SHAFTWAY" in red letters not less than 6 inches (152 mm) high on a white background. Such warning signs shall be placed so as to be readily discernible.

Exception: Markings shall not be required on shaftway openings that are readily discernible as openings onto a shaftway by the construction or arrangement.

[F] 914.2 Equipment room identification. Fire protection equipment shall be identified in an *approved* manner. Rooms containing controls for air-conditioning systems, sprinkler risers and valves or other fire detection, suppression or control elements shall be identified for the use of the fire department. *Approved* signs required to identify fire protection equipment and equipment location shall be constructed of durable materials, permanently installed and readily visible.

SECTION 915
CARBON MONOXIDE DETECTION

[W][F] 915.1 General. Carbon monoxide detection shall be installed in new buildings in accordance with Sections 915.1.1 through 915.6. Carbon monoxide detection shall be installed in existing buildings in accordance with Chapter 11 of the *International Fire Code*.

[W][F] 915.1.1 Where required. Carbon monoxide detection shall be provided in Group I-1, I-2, I-4 and R occupancies and in classrooms in Group E occupancies in the locations specified in Section 915.2 where any of the conditions in Sections 915.1.2 through 915.1.6 exist.

Exceptions:

1. R-2 occupancies, with the exception of R-2 college dormitories, are required to install carbon monoxide detectors without exception.
2. Sleeping units or *dwelling units* in I and R-1 occupancies and R-2 college dormitories, hotels, DOC prisons and work releases and DSHS licensed boarding home and residential treatment facility occupancies which do not themselves contain a fuel-burning appliance, a fuel-burning fireplace, or have an attached garage, need not be provided with carbon monoxide alarms provided that they comply with the exceptions of Section 915.1.4.

[F] 915.1.2 Fuel-burning appliances and fuel-burning fireplaces. Carbon monoxide detection shall be provided in *dwelling units*, *sleeping units* and classrooms that contain a fuel-burning appliance or a fuel-burning fireplace.

[F] 915.1.3 Fuel burning, forced-air furnaces. Carbon monoxide detection shall be provided in *dwelling units*, *sleeping units* and classrooms served by a fuel-burning, forced-air furnace.

Exception: Carbon monoxide detection shall not be required in *dwelling units*, *sleeping units* and classrooms if a carbon monoxide detector is provided in the first room or area served by each main duct leaving the furnace, and the carbon monoxide alarm signals are automatically transmitted to an approved location.

[F] 915.1.4 Fuel-burning appliances outside of dwelling units, sleeping units and classrooms. Carbon monoxide detection shall be provided in *dwelling units*, *sleeping units* and classrooms located in buildings that contain fuel-burning appliances or fuel-burning fireplaces.

Exceptions:

1. Carbon monoxide detection shall not be required in *dwelling units*, *sleeping units* and classrooms without communicating openings between the fuel-burning appliance or fuel-burning fireplace and the *dwelling unit*, *sleeping unit* or classroom.

2. Carbon monoxide detection shall not be required in *dwelling units*, *sleeping units* and classrooms where a carbon monoxide detector is provided in one of the following locations:

   2.1. In an approved location between the fuel-burning appliance or fuel-burning fireplace and the *dwelling unit*, *sleeping unit* or classroom.

   2.2. On the ceiling of the room containing the fuel-burning appliance or fuel-burning fireplace.

[F] 915.1.5 Private garages. Carbon monoxide detection shall be provided in *dwelling units*, *sleeping units* and classrooms in buildings with attached private garages.

Exceptions:

1. Carbon monoxide detection shall not be required in dwelling units, sleeping units and classrooms without communicating openings between the private garage and the *dwelling unit*, *sleeping unit* or classroom.
2. Carbon monoxide detection shall not be required in *dwelling units*, *sleeping units* and classrooms located more than one story above or below a private garage.
3. Carbon monoxide detection shall not be required where the private garage connects to the building through an open-ended corridor.
4. Where a carbon monoxide detector is provided in an approved location between openings to a private garage and *dwelling units*, *sleeping units* or classrooms.

[F] 915.1.6 Exempt garages. For determining compliance with Section 915.1.5, an *open parking garage* complying with Section 406.5 or an enclosed parking garage complying with Section 406.6 shall not be considered a private garage.

[W][F] 915.2 Locations. Where required by Section 915.1.1, carbon monoxide detection shall be installed in the locations specified in Sections 915.2.1 through 915.2.3.

[F] 915.2.1 Dwelling units. Carbon monoxide detection shall be installed in *dwelling units* outside of each separate sleeping area in the immediate vicinity of the bedrooms and on each level of the *dwelling*. Where a fuel-burning appliance or a fuel-burning fireplace is located within a bedroom or its attached bathroom, carbon monoxide detection shall be installed within the bedroom.

[F] 915.2.2 Sleeping units. Carbon monoxide detection shall be installed in *sleeping units*.

Exception: Carbon monoxide detection shall be allowed to be installed outside of each separate sleeping area in the immediate vicinity of the *sleeping unit* where the *sleeping unit* or its attached bathroom does not contain a fuel-burning appliance or a fuel-burning fireplace and is not served by a forced air furnace.

[F] 915.2.3 Group E occupancies. ((~~Carbon~~)) When required by Section 915.1 in new buildings or by Chapter 11 of the International Fire Code, carbon monoxide detectors shall be installed in classrooms in Group E occupancies. Carbon monoxide alarm signals shall be automatically transmitted to an on-site location that is staffed by school personnel.

Exceptions:

1. Carbon monoxide alarm signals shall not be required to be automatically transmitted to an on-site location that is staffed by school personnel in Group E occupancies with an occupant load of ((~~30~~)) 50 or less.
2. Carbon monoxide alarm signals shall not be required to be automatically transmitted to an on-site location that is staffed by school personnel in Group E occupancies where an exception contained in Section 915.1 applies, or in Group E occupancies where signals are transmitted to an off-site service monitored by a third party, such as a service that monitors fire protection systems in the building.

[F] 915.3 Carbon monoxide detection. Carbon monoxide detection required by Sections 915.1 through 915.2.3 shall be provided by carbon monoxide alarms complying with Section 915.4 or carbon monoxide detection systems complying with Section 915.5.

[F] 915.4 Carbon monoxide alarms. Carbon monoxide alarms shall comply with Sections 915.4.1 through 915.4.4.

[F] 915.4.1 Power source. Carbon monoxide alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than that required for overcurrent protection.

Exception: Where installed in buildings without commercial power, battery-powered carbon monoxide alarms shall be an acceptable alternative.

[F] 915.4.2 Listings. Carbon monoxide alarms shall be listed in accordance with UL 2034.

[F] 915.4.3 Locations. Carbon monoxide alarms shall only be installed in *dwelling units* and in *sleeping units*. They shall not be installed in locations where the code requires carbon monoxide detectors to be used.

[F] 915.4.4 Combination alarms. Combination carbon monoxide/smoke alarms shall be an acceptable alternative to carbon monoxide alarms. Combination carbon monoxide/smoke alarms shall be listed in accordance with UL 2034 and UL 217.

CHAPTER 10

MEANS OF EGRESS

User notes:

About this chapter: *Chapter 10 provides the general criteria for designing the means of egress established as the primary method for protection of people in buildings by allowing timely relocation or evacuation of building occupants. Both prescriptive and performance language is utilized in this chapter to provide for a basic approach in the determination of a safe exiting system for all occupancies. It addresses all portions of the egress system (exit access, exits and exit discharge) and includes design requirements as well as provisions regulating individual components. The requirements detail the size, arrangement, number and protection of means of egress components. Functional and operational characteristics that will permit the safe use of components without special knowledge or effort are specified.*

The means of egress protection requirements work in coordination with other sections of the code, such as protection of vertical openings (see Chapter 7), interior finish (see Chapter 8), fire suppression and detection systems (see Chapter 9) and numerous others, all having an impact on life safety. Chapter 10 is subdivided into four main sections: general (Sections 1003–1015), exit access (Sections 1016–1021), exit (Sections 1022–1027) and exit discharge (Section 1028). Special allowances for the unique requirements for assembly spaces (Section 1029) and emergency escape and rescue openings (Section 1030) complete the chapter. Chapter 10 of this code is duplicated in Chapter 10 of the International Fire Code®*; however, the* International Fire Code *contains one additional section on maintenance of the means of egress system in existing buildings.*

Code development reminder: *Code change proposals to sections preceded by the designation [F] will be considered by the International Fire Code Development Committee during the 2019 (Group B) Code Development Cycle. See explanation on page iv.*

SECTION 1001
ADMINISTRATION

1001.1 General. Buildings or portions thereof shall be provided with a *means of egress* system as required by this chapter. The provisions of this chapter shall control the design, construction and arrangement of *means of egress* components required to provide an *approved means of egress* from structures and portions thereof.

1001.2 Minimum requirements. It shall be unlawful to alter a building or structure in a manner that will reduce the number of *exits* or the minimum width or required capacity of the *means of egress* to less than required by this code.

[F] SECTION 1002
MAINTENANCE AND PLANS

[F] 1002.1 Maintenance. *Means of egress* shall be maintained in accordance with the *International Fire Code*.

[F] 1002.2 Fire safety and evacuation plans. Fire safety and evacuation plans shall be provided for all occupancies and buildings where required by the *International Fire Code*. Such fire safety and evacuation plans shall comply with the applicable provisions of Sections 401.2 and 404 of the *International Fire Code*.

SECTION 1003
GENERAL MEANS OF EGRESS

1003.1 Applicability. The general requirements specified in Sections 1003 through 1015 shall apply to all three elements of the *means of egress* system, in addition to those specific requirements for the *exit access*, the *exit* and the *exit discharge* detailed elsewhere in this chapter.

[S] 1003.2 Ceiling height. The *means of egress* shall have a ceiling height of not less than 7 feet 6 inches (2286 mm) above the finished floor.

Exceptions:

1. ((~~Sloped ceilings~~)) Ceilings in accordance with Section 1207.2.

((~~2. Ceilings of *dwelling units* and *sleeping units* within residential occupancies in accordance with Section 1207.2.~~

~~3~~)) 2. Allowable projections in accordance with Section 1003.3.

((~~4~~)) 3. *Stair* headroom in accordance with Section 1011.3.

((~~5~~)) 4. Door height in accordance with Section 1010.1.1.

((~~6~~)) 5. *Ramp* headroom in accordance with Section 1012.5.2.

((~~7~~)) 6. The clear height of floor levels in vehicular and pedestrian traffic areas of public and private parking garages in accordance with Section 406.2.2.

((~~8~~)) 7. Areas above and below *mezzanine* floors in accordance with Section 505.2.

1003.3 Protruding objects. Protruding objects on *circulation paths* shall comply with the requirements of Sections 1003.3.1 through 1003.3.4.

1003.3.1 Headroom. Protruding objects are permitted to extend below the minimum ceiling height required by Section 1003.2 where a minimum headroom of 80 inches (2032 mm) is provided over any circulation paths, including walks, *corridors*, *aisles* and passageways. Not more than 50 percent of the ceiling area of a *means of egress* shall be reduced in height by protruding objects.

Exception: Door closers and stops shall not reduce headroom to less than 78 inches (1981 mm).

A barrier shall be provided where the vertical clearance above a circulation path is less than 80 inches (2032 mm) high above the finished floor. The leading edge of such a barrier shall be located 27 inches (686 mm) maximum above the finished floor.

1003.3.2 Post-mounted objects. A free-standing object mounted on a post or pylon shall not overhang that post or pylon more than 4 inches (102 mm) where the lowest point of the leading edge is more than 27 inches (686 mm) and less than 80 inches (2032 mm) above the finished floor. Where a sign or other obstruction is mounted between posts or pylons and the clear distance between the posts or pylons is greater than 12 inches (305 mm), the lowest edge of such sign or obstruction shall be 27 inches (686 mm) maximum or 80 inches (2032 mm) minimum above the finished floor or ground.

Exception: These requirements shall not apply to sloping portions of *handrails* between the top and bottom riser of *stairs* and above the *ramp* run.

1003.3.3 Horizontal projections. Objects with leading edges more than 27 inches (685 mm) and not more than 80 inches (2030 mm) above the finished floor shall not project horizontally more than 4 inches (102 mm) into the *circulation path*.

Exception: *Handrails* are permitted to protrude 4-1/2 inches (114 mm) from the wall or *guard*.

1003.3.4 Clear width. Protruding objects shall not reduce the minimum clear width of *accessible routes*.

1003.4 Slip-resistant surface. Circulation paths of the *means of egress* shall have a slip-resistant surface and be securely attached.

[S] 1003.5 Elevation change. Where changes in elevation of less than 12 inches (305 mm) exist in the *means of egress*, sloped surfaces shall be used. Where the slope is greater than one unit vertical in 20 units horizontal (5-percent slope), *ramps* complying with Section 1012 shall be used. Where the difference in elevation is 6 inches (152 mm) or less, the *ramp* shall be equipped with either *handrails* or floor finish materials that contrast with adjacent floor finish materials.

Exceptions:

1. A single step with a maximum riser height of 7 inches (178 mm) is permitted for buildings with occupancies in Groups F, H, R-2, R-3, S and U at exterior doors not required to be *accessible* by Chapter 11.
2. A *stair* with a single riser or with two risers and a tread is permitted at locations not required to be *accessible* by Chapter 11 and not within a stairway with two or more flights of stairs, where the risers and treads comply with Section 1011.5, the minimum depth of the tread is 13 inches (330 mm) and not less than one *handrail* complying with Section 1014 is provided within 30 inches (762 mm) of the centerline of the normal path of egress travel on the *stair*.
3. A step is permitted in *aisles* serving seating that has a difference in elevation less than 12 inches (305 mm) at locations not required to be *accessible* by Chapter 11, provided that the risers and treads comply with Section 1029.14 and the *aisle* is provided with a *handrail* complying with Section 1029.16.

Throughout a story in a Group I-2 occupancy, any change in elevation in portions of the *means of egress* that serve nonambulatory persons shall be by means of a *ramp* or sloped walkway.

1003.6 Means of egress continuity. The path of egress travel along a *means of egress* shall not be interrupted by a building element other than a *means of egress* component as specified in this chapter. Obstructions shall not be placed in the minimum width or required capacity of a *means of egress* component except projections permitted by this chapter. The minimum width or required capacity of a *means of egress* system shall not be diminished along the path of egress travel.

1003.7 Elevators, escalators and moving walks. Elevators, escalators and moving walks shall not be used as a component of a required *means of egress* from any other part of the building.

Exception: Elevators used as an accessible *means of egress* in accordance with Section 1009.4.

SECTION 1004
OCCUPANT LOAD

1004.1 Design occupant load. In determining *means of egress* requirements, the number of occupants for whom *means of egress* facilities are provided shall be determined in accordance with this section.

Interpretation I1004.1: The occupant load factor for occupied roofs is 15 net unless the *construction documents* indicate use other than unconcentrated assembly.

1004.2 Cumulative occupant loads. Where the path of egress travel includes intervening rooms, areas or spaces, cumulative *occupant loads* shall be determined in accordance with this section.

1004.2.1 Intervening spaces or accessory areas. Where occupants egress from one or more rooms, areas or spaces through others, the design *occupant load* shall be the combined *occupant load* of interconnected accessory or intervening spaces. Design of egress path capacity shall be based on the cumulative portion of *occupant loads* of all rooms, areas or spaces to that point along the path of egress travel.

1004.2.2 Adjacent levels for mezzanines. That portion of the *occupant load* of a *mezzanine* with required egress through a room, area or space on an adjacent level shall be added to the *occupant load* of that room, area or space.

1004.2.3 Adjacent stories. Other than for the egress components designed for convergence in accordance with Section 1005.6, the *occupant load* from separate stories shall not be added.

1004.3 Multiple function occupant load. Where an area under consideration contains multiple functions having different occupant load factors, the design *occupant load* for such area shall be based on the floor area of each function calculated independently.

1004.4 Multiple occupancies. Where a building contains two or more occupancies, the *means of egress* requirements shall apply to each portion of the building based on the occupancy of that space. Where two or more occupancies utilize portions of the same *means of egress* system, those egress components shall meet the more stringent requirements of all occupancies that are served.

1004.5 Areas without fixed seating. The number of occupants shall be computed at the rate of one occupant per unit of area as prescribed in Table 1004.5. For areas without *fixed seating*, the occupant load shall be not less than that number determined by dividing the floor area under consideration by the *occupant load* factor assigned to the function of the space as set forth in Table 1004.5. Where an intended function is not listed in Table 1004.5, the *building official* shall establish a function based on a listed function that most nearly resembles the intended function.

Exception: Where *approved* by the *building official*, the actual number of occupants for whom each occupied space, floor or building is designed, although less than those determined by calculation, shall be permitted to be used in the determination of the design *occupant load*.

[W][S] TABLE 1004.5
MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT

FUNCTION OF SPACE	OCCUPANT LOAD FACTOR[a]
Accessory storage areas, mechanical equipment room[b]	300 gross
Agricultural building	300 gross
Aircraft hangars	500 gross
Airport terminal Baggage claim Baggage handling Concourse Waiting areas	 20 gross 300 gross 100 gross 15 gross
Assembly Gaming floors (keno, slots, etc.) Exhibit gallery and museum	 11 gross 30 net
Assembly with fixed seats	See Section 1004.6
Assembly without fixed seats Concentrated (chairs only—not fixed) Standing space Unconcentrated (tables and chairs)	 7 net 5 net 15 net
Bowling centers, allow 5 persons for each lane including 15 feet of runway, and for additional areas	7 net
Business areas Concentrated business use areas	150 gross See Section 1004.8
Commercial laboratories	100 gross
Courtrooms—other than fixed seating areas	40 net
Day care	35 net
Dormitories	50 gross
Educational Classroom area Shops, laboratories and other vocational room areas	 20 net 50 net
Exercise rooms	50 gross
Group H-5 fabrication and manufacturing areas	200 gross
Industrial areas	100 gross
Institutional areas Inpatient treatment areas Outpatient areas Sleeping areas	 240 gross 100 gross 120 gross
Kitchens, commercial	200 gross
Library Reading rooms Stack area	 50 net 100 gross
Locker rooms	50 gross
Mall buildings—covered and open	See Section 402.8.2
Mercantile [W] Group M Art gallery Storage, stock, shipping areas	60 gross 30 gross 300 gross
Parking garages	200 gross
Residential	200 gross
Skating rinks, swimming pools Rink and pool Decks	 50 gross 15 gross
Stages and platforms	15 net
Warehouses	500 gross

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2.

a. Floor area in square feet per occupant.

b. For electrical equipment areas, see also Sections 110.26 and 110.32 through 110.34 of the Seattle Electrical Code.

1004.5.1 Increased occupant load. The *occupant load* permitted in any building, or portion thereof, is permitted to be increased from that number established for the occupancies in Table 1004.5, provided that all other requirements of the code are met based on such modified number and the *occupant load* does not exceed one occupant per 7 square feet (0.65 m^2) of occupiable floor space. Where required by the *building official*, an *approved aisle*, seating or fixed equipment diagram substantiating any increase in *occupant load* shall be submitted. Where required by the *building official*, such diagram shall be posted.

1004.6 Fixed seating. For areas having *fixed seats* and *aisles*, the *occupant load* shall be determined by the number of *fixed seats* installed therein. The *occupant load* for areas in which *fixed seating* is not installed, such as waiting spaces, shall be determined in accordance with Section 1004.5 and added to the number of *fixed seats*.

The *occupant load* of *wheelchair spaces* and the associated companion seat shall be based on one occupant for each *wheelchair space* and one occupant for the associated companion seat provided in accordance with Section 1108.2.3.

For areas having *fixed seating* without dividing arms, the *occupant load* shall be not less than the number of seats based on one person for each 18 inches (457 mm) of seating length.

The *occupant load* of seating booths shall be based on one person for each 24 inches (610 mm) of booth seat length measured at the backrest of the seating booth.

1004.7 Outdoor areas. *Yards*, patios, occupied roofs, *courts* and similar outdoor areas accessible to and usable by the building occupants shall be provided with *means of egress* as required by this chapter. The *occupant load* of such outdoor areas shall be assigned by the *building official* in accordance with the anticipated use. Where outdoor areas are to be used by persons in addition to the occupants of the building, and the path of egress travel from the outdoor areas passes through the building, *means of egress* requirements for the building shall be based on the sum of the *occupant loads* of the building plus the outdoor areas.

Exceptions:

1. Outdoor areas used exclusively for service of the building need only have one *means of egress*.
2. Both outdoor areas associated with Group R-3 and individual dwelling units of Group R-2.

1004.8 Concentrated business use areas. The occupant load factor for concentrated business use shall be applied to telephone call centers, trading floors, electronic data processing centers and similar business use areas with a higher density of occupants than would normally be expected in a typical business occupancy environment. Where approved by the *building official*, the occupant load for concentrated business use areas shall be the actual *occupant load*, but not less than one occupant per 50 square feet (4.65 m^2) of gross occupiable floor space.

1004.9 Posting of occupant load. Every room or space that is an assembly occupancy shall have the *occupant load* of the room or space posted in a conspicuous place, near the main *exit* or *exit access doorway* from the room or space, for the intended configurations. Posted signs shall be of an approved legible permanent design and shall be maintained by the owner or the owner's authorized agent.

SECTION 1005
MEANS OF EGRESS SIZING

1005.1 General. All portions of the *means of egress* system shall be sized in accordance with this section.

Exception: *Aisles* and *aisle accessways* in rooms or spaces used for assembly purposes complying with Section 1029.

[S] 1005.2 Minimum width based on component. The minimum width, in inches (mm), of any *means of egress* components shall be not less than that specified for such component, elsewhere in this code. The width at any point in the path of egress travel shall not be less than the width required for doors in Section 1010.

Exceptions:

1. *Aisles* and *aisle accessways* complying with Section 1018.
2. Corridors complying with Section 1020.2.
3. Stage stairways and catwalks complying with Section 410.6.

1005.3 Required capacity based on occupant load. The required capacity, in inches (mm), of the *means of egress* for any room, area, space or story shall be not less than that determined in accordance with Sections 1005.3.1 and 1005.3.2:

1005.3.1 Stairways. The capacity, in inches, of *means of egress stairways* shall be calculated by multiplying the *occupant load* served by such *stairways* by a means of egress capacity factor of 0.3 inch (7.6 mm) per occupant. Where *stairways* serve more than one story, only the occupant load of each story considered individually shall be used in calculating the required capacity of the *stairways* serving that story.

Exceptions:

1. For other than Group H and I-2 occupancies, the capacity, in inches, of *means of egress stairways* shall be calculated by multiplying the *occupant load* served by such *stairways* by a means of egress capacity factor of 0.2 inch (5.1 mm) per occupant in buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 and an *emergency voice/alarm communication* system in accordance with Section 907.5.2.2.
2. Facilities with *smoke-protected assembly seating* shall be permitted to use the capacity factors in Table 1029.6.2 indicated for stepped aisles for *exit access* or *exit stairways* where the entire path for *means of egress* from the seating to the *exit discharge* is provided with a smoke control system complying with Section 909.
3. Facilities with *open-air assembly seating* shall be permitted to the capacity factors in Section 1029.6.3 indicated for stepped aisles for *exit access* or *exit stairways* where the entire path for *means of egress* from the seating to the *exit discharge* is open to the outdoors.

1005.3.2 Other egress components. The capacity, in inches, of *means of egress* components other than *stairways* shall be calculated by multiplying the *occupant load* served by such component by a means of egress capacity factor of 0.2 inch (5.1 mm) per occupant.

Exceptions:

1. For other than Group H and I-2 occupancies, the capacity, in inches, of *means of egress* components other than *stairways* shall be calculated by multiplying the *occupant load* served by such component by a means of egress capacity factor of 0.15 inch (3.8 mm) per occupant in buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 and an *emergency voice/alarm communication* system in accordance with Section 907.5.2.2.
2. Facilities with *smoke-protected assembly seating* shall be permitted to use the capacity factors in Table 1029.6.2 indicated for level or ramped *aisles* for *means of egress* components other than *stairways* where the entire path for *means of egress* from the seating to the *exit discharge* is provided with a smoke control system complying with Section 909.
3. Facilities with *open-air assembly seating* shall be permitted to the capacity factors in Section 1029.6.3 indicated for level or ramped *aisles* for *means of egress* components other than *stairways* where the entire path for *means of egress* from the seating to the *exit discharge* is open to the outdoors.

1005.4 Continuity. The minimum width or required capacity of the *means of egress* required from any story of a building shall not be reduced along the path of egress travel until arrival at the public way.

1005.5 Distribution of minimum width and required capacity. Where more than one *exit*, or access to more than one *exit*, is required, the *means of egress* shall be configured such that the loss of any one *exit*, or access to one *exit*, shall not reduce the available capacity or width to less than 50 percent of the required capacity or width.

[S] 1005.6 Egress convergence. Where the *means of egress* from stories above and below converge at an intermediate level, the capacity of the *means of egress* from the point of convergence shall be not less than the largest minimum width or the sum of the required capacities for the *stairways* or *ramps* serving the two adjacent stories, whichever is larger.

Exception: The capacity necessary for parking uses need not be considered.

1005.7 Encroachment. Encroachments into the required *means of egress* width shall be in accordance with the provisions of this section.

1005.7.1 Doors. Doors, when fully opened, shall not reduce the required width by more than 7 inches (178 mm). Doors in any position shall not reduce the required width by more than one-half.

Exceptions:

1. Surface-mounted latch release hardware shall be exempt from inclusion in the 7-inch maximum (178 mm) encroachment where both of the following conditions exist:
   1.1. The hardware is mounted to the side of the door facing away from the adjacent wall where the door is in the open position.
   1.2. The hardware is mounted not less than 34 inches (865 mm) nor more than 48 inches (1219 mm) above the finished floor.
2. The restrictions on door swing shall not apply to doors within individual *dwelling units* and *sleeping units* of Group R-2 occupancies and *dwelling units* of Group R-3 occupancies.

1005.7.2 Other projections. *Handrail* projections shall be in accordance with the provisions of Section 1014.8. Other nonstructural projections such as trim and similar decorative features shall be permitted to project into the required width not more than 1-1/2 inches (38 mm) on each side.

Exception: Projections are permitted in corridors within Group I-2 Condition 1 in accordance with Section 407.4.3.

1005.7.3 Protruding objects. Protruding objects shall comply with the applicable requirements of Section 1003.3.

SECTION 1006
NUMBER OF EXITS AND EXIT ACCESS DOORWAYS

1006.1 General. The number of *exits* or *exit access doorways* required within the *means of egress* system shall comply with the provisions of Section 1006.2 for spaces, including *mezzanines*, and Section 1006.3 for *stories* or occupied roofs.

[W] 1006.2 Egress from spaces. Rooms, areas or spaces, including *mezzanines*, within a *story* or *basement* shall be provided with the number of *exits* or access to *exits* in accordance with this section.

1006.2.1 Egress based on occupant load and common path of egress travel distance. Two *exits* or *exit access doorways* from any space shall be provided where the design *occupant load* or the *common path of egress travel* distance exceeds the values listed in Table 1006.2.1. The cumulative *occupant load* from adjacent rooms, areas or spaces shall be determined in accordance with Section 1004.2.

Exceptions:

1. The number of *exits* from foyers, lobbies, vestibules or similar spaces need not be based on cumulative *occupant loads* for areas discharging through such spaces, but the capacity of the *exits* from such spaces shall be based on applicable cumulative *occupant loads*.
2. *Care suites* in Group I-2 occupancies complying with Section 407.4.
3. Unoccupied mechanical rooms and penthouses are not required to comply with the common path of egress travel distance measurement.

[W] TABLE 1006.2.1
SPACES WITH ONE EXIT OR EXIT ACCESS DOORWAY

OCCUPANCY	MAXIMUM OCCUPANT LOAD OF SPACE	MAXIMUM COMMON PATH OF EGRESS TRAVEL DISTANCE (feet)		
		Without Sprinkler System (feet)		With Sprinkler System (feet)
		Occupant Load		
		OL ≤ 30	OL > 30	
A[c], E, M[h]	49	75	75	75[a]
B	49	100	75	100[a]
F	49	75	75	100[a]
H-1, H-2, H-3	3	NP	NP	25[b]
H-4, H-5	10	NP	NP	75[b]
I-1, I-2[d], I-4	10	NP	NP	75[a]
I-3	10	NP	NP	100[a]
R-1	10	NP	NP	75[a]
R-2	20	NP	NP	125[a]
R-3[e]	20	NP	NP	125[a, g]
((~~R-4[e]~~	~~20~~	~~NP~~	~~NP~~	~~125[a, g]~~))
S[f]	29	100	75	100[a]
U	49	100	75	75[a]

For SI: 1 foot = 304.8 mm.
NP = Not Permitted.

a. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2. See Section 903 for occupancies where automatic sprinkler systems are permitted in accordance with Section 903.3.1.2.
b. Group H occupancies equipped throughout with an automatic sprinkler system in accordance with Section 903.2.5.
c. For a room or space used for assembly purposes having fixed seating, see Section 1029.8.
d. For the travel distance limitations in Group I-2, see Section 407.4.
e. The common path of egress travel distance shall only apply in a Group R-3 occupancy located in a mixed occupancy building.
f. The length of common path of egress travel distance in a Group S-2 open parking garage shall be not more than 100 feet.
g. For the travel distance limitations in Groups R-3 ((~~and R-4~~)) equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.3, see Section 1006.2.2.6.
h. Day care facilities, rooms or spaces where care is provided for more than 10 children that are 2-1/2 years of age or less, shall have access to not less than two exits or exit access doorways.

1006.2.1.1 Three or more exits or exit access doorways. Three *exits* or *exit access doorways* shall be provided from any space with an occupant load of 501 to 1,000. Four *exits* or *exit access doorways* shall be provided from any space with an occupant load greater than 1,000.

1006.2.2 Egress based on use. The numbers of *exits* or access to *exits* shall be provided in the uses described in Sections 1006.2.2.1 through 1006.2.2.6.

1006.2.2.1 Boiler, incinerator and furnace rooms. Two *exit access doorways* are required in boiler, incinerator and furnace rooms where the area is over 500 square feet (46 m^2) and any fuel-fired equipment exceeds 400,000 British thermal units (Btu) (422 000 KJ) input capacity. Where two *exit access doorways* are required, one is permitted to be a fixed ladder or an *alternating tread device*. *Exit access doorways* shall be separated by a horizontal distance equal to one-half the length of the maximum overall diagonal dimension of the room.

1006.2.2.2 Refrigeration machinery rooms. Machinery rooms larger than 1,000 square feet (93 m^2) shall have not less than two *exits* or *exit access doorways*. Where two *exit access doorways* are required, one such doorway is permitted to be served by a fixed ladder or an *alternating tread device*. *Exit access doorways* shall be separated by a horizontal distance equal to one-half the maximum horizontal dimension of the room.

All portions of machinery rooms shall be within 150 feet (45 720 mm) of an *exit* or *exit access doorway*. An increase in *exit access* travel distance is permitted in accordance with Section 1017.1.

Exit and *exit access doorways* shall swing in the direction of egress travel, regardless of the *occupant load* served. *Exit* and *exit access doorways* shall be tight fitting and self-closing.

1006.2.2.3 Refrigerated rooms or spaces. Rooms or spaces having a floor area larger than 1,000 square feet (93 m^2), containing a refrigerant evaporator and maintained at a temperature below 68°F (20°C), shall have access to not less than two *exits* or *exit access doorways*.

Exit access travel distance shall be determined as specified in Section 1017.1, but all portions of a refrigerated room or space shall be within 150 feet (45 720 mm) of an *exit* or *exit access doorway* where such rooms are not protected by an approved *automatic sprinkler system*. Egress is allowed through adjoining refrigerated rooms or spaces.

Exception: Where using refrigerants in quantities limited to the amounts based on the volume set forth in the *International Mechanical Code*.

[W] 1006.2.2.4 Reserved. ((~~Group I-4 means of egress.~~ ~~Group I-4 facilities, rooms or spaces where care is provided for more than 10 children that are 2-1/2 years of age or less, shall have access to not less than two *exits* or *exit access doorways*.~~))

1006.2.2.5 Vehicular ramps. Vehicular ramps shall not be considered as an *exit access ramp* unless pedestrian facilities are provided.

((~~1006.2.2.6 Groups R-3 and R-4.~~ ~~Where Group R-3 occupancies are permitted by Section 903.2.8 to be protected by an *automatic sprinkler system* installed in accordance with Section 903.3.1.3, the *exit access* travel distance for Group R-3 shall be not more than 125 feet (38 100 mm). Where Group R-4 occupancies are permitted by Section 903.2.8 to be protected by an *automatic sprinkler system* installed in accordance with Section 903.3.1.3, the *exit access* travel distance for Group R-4 shall be not more than 75 feet (22 860 mm).~~))

1006.2.2.6 Electrical equipment rooms. Rooms containing electrical equipment shall be provided with a second exit or exit access doorways as required by NFPA 70 Article 110 where all of the following apply:

1. The electrical equipment is rated at 1,200 amperes or more.
2. The electrical equipment is over 6 feet (1829 mm) wide.
3. The electrical equipment contains overcurrent devices, switching devices or control devices.

[S] 1006.3 Egress from stories or occupied roofs. The *means of egress* system serving any *story* or occupied roof shall be provided with the number of separate and distinct *exits* or access to *exits* based on the aggregate *occupant load* served in accordance with this section. Horizontal exits shall not count toward the required number of exits from the *story* or roof. Where *stairways* serve more than one *story*, only the occupant load of each *story* considered individually shall be used in calculating the required number of *exits* or access to *exits* serving that *story*.

Note: In high-rise buildings required to have an additional exit stairway by Section 403.5.2, all exit stairways must be accessible to all tenants on a floor without having to pass through another tenant space.

1006.3.1 Adjacent story. The path of egress travel to an *exit* shall not pass through more than one adjacent *story*.

Exception: The path of egress travel to an *exit* shall be permitted to pass through more than one adjacent *story* in any of the following:

1. In Group R-1, R-2 or R-3 occupancies, exit access stairways and ramps connecting four stories or less serving and contained within an individual dwelling unit, sleeping unit or live/work unit.
2. Exit access stairways serving and contained within a Group R-3 congregate residence or a Group R-4 facility.
3. Exit access stairways and ramps in open parking garages that serve only the parking garage.
4. Exit access stairways and ramps serving open-air assembly seating complying with the exit access travel distance requirements of Section 1029.7.
5. Exit access stairways and ramps between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, places of religious worship, auditoriums and sports facilities.

1006.3.2 Egress based on occupant load. Each *story* and occupied roof shall have the minimum number of separate and distinct *exits*, or access to *exits*, as specified in Table 1006.3.2. A single *exit* or access to a single *exit* shall be permitted in accordance with Section 1006.3.3. The required number of *exits*, or *exit access stairways* or *ramps* providing access to *exits*, from any *story* or occupied roof shall be maintained until arrival at the *exit discharge* or a *public way*.

TABLE 1006.3.2
MINIMUM NUMBER OF EXITS OR ACCESS TO EXITS PER STORY

OCCUPANT LOAD PER STORY	MINIMUM NUMBER OF EXITS OR ACCESS TO EXITS FROM STORY
1-500	2
501-1,000	3
More than 1,000	4

[W][S] 1006.3.3 Single exits. A single *exit* or access to a single *exit* shall be permitted from any *story* or occupied roof where one of the following conditions exists:

1. The *occupant load*, number of *dwelling units* and ((~~common path of egress~~)) exit access travel distance within the portion of the building served by the single exit do not exceed the values in Table 1006.3.3(1) or 1006.3.3(2).
2. Rooms, areas and spaces complying with Section 1006.2.1 with *exits* that discharge directly to the exterior at the *level of exit discharge*, are permitted to have one *exit* or access to a single *exit*.
3. Parking garages where vehicles are mechanically parked shall be permitted to have one *exit* or access to a single *exit*.
4. Group R-3 ((~~and R-4~~)) occupancies shall be permitted to have one *exit* or access to a single *exit*.
5. Individual single-story or multistory *dwelling units* shall be permitted to have a single exit or access to a single *exit* from the *dwelling unit* provided that both of the following criteria are met:
   - 5.1. The *dwelling unit* complies with Section 1006.2.1 as a space with one *means of egress*.
   - 5.2. Either the *exit* from the *dwelling unit* discharges directly to the exterior at the *level of exit discharge*, or the *exit access* outside the dwelling unit's entrance door provides access to not less than two approved independent *exits*.
6. Occupied roofs with an occupant load of ten or less are permitted to have a single exit or access to a single exit.
7. Not more than 5 *stories* of Group R-2 occupancy are permitted to be served by a single exit under the following conditions:
   - 7.1. The building has not more than six *stories above grade plane*.
   - 7.2. The building does not contain a *boarding house*.
   - 7.3. There shall be no more than four *dwelling units* on any floor.
   - 7.4. The building shall be of not less than one hour fire-resistive construction and shall also be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1. Residential-type sprinklers shall be used in all habitable spaces in each *dwelling unit*.
   - 7.5. There shall be no more than two single exit stairway conditions on the same property.
   - 7.6. An exterior stairway or interior exit stairway shall be provided. The interior exit stairway, including any related *exit passageway*, shall be pressurized in accordance with Section 909.20. Doors in the stairway shall swing into the interior exit stairway regardless of the occupant load served, provided that doors from the interior exit stairway to the building exterior are permitted to swing in the direction of exit travel.
   - 7.7. A *corridor* shall separate each *dwelling unit* entry/exit door from the door to an interior exit stairway, including any related *exit passageway*, on each floor. *Dwelling unit* doors shall not open directly into an interior exit stairway. *Dwelling unit* doors are permitted to open directly into an exterior stairway.

7.8. There shall be no more than 20 feet (6096 mm) of travel to the exit stairway from the entry/exit door of any dwelling unit.

7.9. Travel distance measured in accordance with Section 1017 shall not exceed 125 feet.

7.10. The exit shall not terminate in an egress *court* where the *court* depth exceeds the *court* width unless it is possible to exit in either direction to the public way.

7.11. Elevators shall be pressurized in accordance with Section 909.21 or shall open into elevator lobbies that comply with Section 713.14. Where *approved* by the *building official*, natural ventilation is permitted to be substituted for pressurization where the ventilation would prevent the accumulation of smoke or toxic gases.

7.12. Other occupancies are permitted in the same building provided they comply with all the requirements of this code. Other occupancies shall not communicate with the Group R occupancy portion of the building or with the single-exit stairway.

Exception: Parking garages and occupied roofs accessory to the Group R occupancy are permitted to communicate with the exit stairway.

7.13. The exit serving the Group R occupancy shall not discharge through any other occupancy, including an accessory parking garage.

7.14. There shall be no openings within 10 feet (3048 mm) of unprotected openings into the stairway other than required exit doors having a one-hour fire-resistance rating.

[W] TABLE 1006.3.3(1)
STORIES WITH ONE EXIT OR ACCESS TO ONE EXIT FOR R-2 OCCUPANCIES

STORY	OCCUPANCY	MAXIMUM NUMBER OF DWELLING UNITS	MAXIMUM ((~~COMMON PATH OF EGRESS~~)) EXIT ACCESS TRAVEL DISTANCE
Basement, first, second or third story above grade plane	R-2[a, b]	4 dwelling units	125 feet
Fourth story above grade plane and higher	NP	NA	NA

For SI: 1 foot = 3048 mm.
NP = Not Permitted.
NA = Not Applicable.
a. Buildings classified as Group R-2 equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with emergency escape and rescue openings in accordance with Section 1030.
b. This table is used for R-2 occupancies consisting of dwelling units. For R-2 occupancies consisting of sleeping units, use Table 1006.3.3(2).

[W] TABLE 1006.3.3(2)
STORIES WITH ONE EXIT OR ACCESS TO ONE EXIT FOR OTHER OCCUPANCIES

STORY	OCCUPANCY	MAXIMUM OCCUPANT LOAD PER STORY	MAXIMUM ((~~COMMON PATH OF EGRESS~~)) EXIT ACCESS TRAVEL DISTANCE (feet)
First story above or below grade plane	A, B[b], E F[b], M, U	49	75
	H-2, H-3	3	25
	H-4, H-5, I, R-1, R-2[a, c]	10	75
	S[b, d]	29	75
Second story above grade plane	B, F, M, S[d]	29	75
Third story above grade plane and higher	NP	NA	NA

For SI: 1 foot = 304.8 mm.
NP = Not Permitted.
NA = Not Applicable.
a. Buildings classified as Group R-2 equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with emergency escape and rescue openings in accordance with Section 1030.
b. Group B, F and S occupancies in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 shall have a maximum exit access travel distance of 100 feet.
c. This table is used for R-2 occupancies consisting of sleeping units. For R-2 occupancies consisting of dwelling units, use Table 1006.3.3(1).
d. The length of exit access travel distance in a Group S-2 open parking garage shall be not more than 100 feet.

1006.3.3.1 Mixed occupancies. Where one *exit*, or *exit access stairway* or *ramp* providing access to *exits* at other *stories*, is permitted to serve individual *stories*, mixed occupancies shall be permitted to be served by single *exits* provided each individual occupancy complies with the applicable requirements of Table 1006.3.3(1) or 1006.3.3(2) for that occupancy. Where applicable, cumulative *occupant loads* from adjacent occupancies shall be considered to be in accordance with the provisions of Section 1004.1. In each *story* of a mixed occupancy building, the maximum number of occupants served by a single *exit* shall be such that the sum of the ratios of the calculated number of occupants of the space divided by the

allowable number of occupants indicated in Table 1006.3.3(2) for each occupancy does not exceed one. Where *dwelling units* are located on a story with other occupancies, the actual number of *dwelling units* divided by four plus the ratio from the other occupancy does not exceed one.

SECTION 1007
EXIT AND EXIT ACCESS DOORWAY CONFIGURATION

[S] 1007.1 General. *Exits*, *exit access doorways*, and *exit access stairways* and *ramps* serving spaces, including individual building *stories*, shall be separated in accordance with the provisions of this section. Interlocking or scissor stairs and stairways that share a wall with other exit stairways shall be counted as one exit or exit access.

1007.1.1 Two exits or exit access doorways. Where two *exits*, *exit access doorways*, *exit access stairways* or *ramps*, or any combination thereof, are required from any portion of the *exit access*, they shall be placed a distance apart equal to not less than one-half of the length of the maximum overall diagonal dimension of the building or area to be served measured in a straight line between them. ((~~Interlocking or *scissor stairways* shall be counted as one *exit stairway*.~~))

Exceptions:

1. Where interior *exit stairways* or *ramps* are interconnected by a 1-hour fire-resistance-rated corridor conforming to the requirements of Section 1020, the required exit separation shall be measured along the shortest direct line of travel within the corridor.

Interpretation I1007.1: Exception 1 applies only where *corridors* have a one-hour fire-resistance-rating even where Section 1020 would allow non-rated *corridors*.

2. Where a building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2, the separation distance shall be not less than one-third of the length of the maximum overall diagonal dimension of the area served.
3. Where it is not practical to separate exits by one-half the diagonal dimension, exits from retail and office tenant spaces in Group B and M occupancies and within *dwelling units* shall be as far apart as reasonably practicable as determined by the *building official*.

Note: Interior exit stairways in high-rise buildings shall also meet the requirements of Section 403.5.1.

1007.1.1.1 Measurement point. The separation distance required in Section 1007.1.1 shall be measured in accordance with the following:

1. The separation distance to *exit* or *exit access doorways* shall be measured to any point along the width of the doorway.
2. The separation distance to *exit access stairways* shall be measured to any point along the width of the closest riser.
3. The separation distance to *exit access ramps* shall be measured to any point along the width of the start of the ramp run.

Interpretation I1007.1.1.1: In items 1-3, separation distance is permitted to be measured to the farthest point.

1007.1.2 Three or more exits or exit access doorways. Where access to three or more *exits* is required, not less than two *exit* or *exit access doorways* shall be arranged in accordance with the provisions of Section 1007.1.1. Additional required *exit* or *exit access doorways* shall be arranged a reasonable distance apart so that if one becomes blocked, the others will be available.

1007.1.3 Remoteness of exit access stairways or ramps. Where two *exit access stairways* or *ramps* provide the required *means of egress* to *exits* at another *story*, the required separation distance shall be maintained for all portions of such *exit access stairways* or *ramps*.

1007.1.3.1 Three or more exit access stairways or ramps. Where more than two *exit access stairways* or *ramps* provide the required *means of egress*, not less than two shall be arranged in accordance with Section 1007.1.3.

SECTION 1008
MEANS OF EGRESS ILLUMINATION

[S] 1008.1 Means of egress illumination. Illumination shall be provided at every point in the *means of egress* in accordance with Section 1008.2. Under emergency power, means of egress illumination shall comply with Section 1008.3.

1008.2 Illumination required. The *means of egress* serving a room or space shall be illuminated at all times that the room or space is occupied.

Exceptions:

1. Occupancies in Group U.
2. *Aisle accessways* in Group A.
3. *Dwelling units* and *sleeping units* in Groups R-1, R-2 and R-3.
4. *Sleeping units* of Group I occupancies.

1008.2.1 Illumination level under normal power. The *means of egress* illumination level shall be not less than 1 footcandle (11 lux) at the walking surface. Luminaires shall be installed whenever exit signs are required by Section 1013.

Exception: For auditoriums, theaters, concert or opera halls and similar assembly occupancies, the illumination at the walking surface is permitted to be reduced during performances by one of the following methods provided that the required illumination is automatically restored upon activation of a premises' fire alarm system:

1. Externally illuminated walking surfaces shall be permitted to be illuminated to not less than 0.2 footcandle (2.15 lux).
2. Steps, landings and the sides of ramps shall be permitted to be marked with self-luminous materials in accordance with Sections 1025.2.1, 1025.2.2 and 1025.2.4 by systems *listed* in accordance with UL 1994.

1008.2.2 Group I-2. In Group I-2 occupancies where two or more exits are required, on the exterior landings required by Section 1010.1.6, means of egress illumination levels for the exit discharge shall be provided such that failure of a single lamp in a luminaire shall not reduce the illumination level on that landing to less than 1 footcandle (11 lux).

Code Alternate CA1008.2: Compliance with the following paragraphs will be deemed to satisfy the requirement for means of egress illumination at every point in the means of egress. Means of egress illumination systems that comply with this Code Alternate shall also comply with Section 1008.3.

1. **Location and fixture placement.** Means of egress illumination shall be located in stairways, *corridor*s, halls, passenger elevator cars, lobbies, rooms with an occupant load of 100 or more, and other areas required to provide safe egress from the premises and immediately outside of the building exit when required by the *building official*. Fixtures shall be installed to not less than the following schedule:

1.1	Interior and exterior stairways and landings and outside building exit	At least one per landing
1.2	Corridors and halls and designated means of egress paths in parking garages	At least one for each 40 lineal feet
1.3	Lobbies, vestibules, foyers, elevator cars and other similar areas as required	At least one for each 250 square feet
1.4	Warehouses	See Item 2 below.

These fixtures are permitted to be included in the watts per square foot calculation for means of egress illumination.

2. **Amount of Illumination.** Where means of egress illumination is required, illumination shall be provided at the rate of 0.1 watts of fluorescent or 0.05 watts of LED illumination per square foot of area. Installations using incandescent lamps shall have a minimum wattage of at least 3 times the fluorescent requirements. Use of other light sources is subject to the approval of the *building official*.

Exceptions:

1. In warehouses, the allowable minimum illumination is permitted to be 0.1 watt per square foot (0.03 watts for fluorescent or 0.02 watts for LED) provided fixtures are placed either:
   - 1.1 Where means of egress pathways are not designated, fixtures shall be placed to cover an area not larger than 1,600 square feet, or
   - 1.2 Where means of egress pathways are designated, fixtures shall be placed at least one for every 40 lineal feet.
2. In theaters, auditoriums or other places of assembly where motion pictures or other projections are made by means of directed light, the minimum allowable illumination is permitted to be reduced to 0.05 watts per square foot of floor area (0.02 watts for fluorescent or 0.01 watts for LED). The higher level of required illumination shall be automatically restored upon activation of a premises fire alarm system where such system is provided.
3. In Groups B, F-1, M and S-1 occupancies, when *approved* by the *building official*, the minimum allowable illumination in the exit access is permitted to be reduced to 0.05 watts per square foot (0.02 watts for fluorescent or 0.01 watts for LED) of floor area.

4. In Group B occupancies and open parking garages, when *approved* by the *building official*, the illumination is permitted to be eliminated when within 50 feet of a window wall or open side and where light is not totally obscured.

Means of egress illumination fixtures shall be spaced and designed to give adequate distribution of light for safe egress and so that the failure of any individual lighting element, such as the burning out of a light bulb, will not leave any space in total darkness. Illumination from battery-operated fixtures shall provide the same level of illumination required for hard-wired fixtures.

[W] ((~~1008.2.3 Exit discharge.~~ ~~Illumination shall be provided along the path of travel for the *exit discharge* from each *exit* to the *public way*.~~

~~**Exception:** Illumination shall not be required where the path of the *exit discharge* meets both of the following requirements:~~

~~1. The path of exit discharge is illuminated from the exit to a safe dispersal area complying with Section 1028.5.~~

~~2. A dispersal area shall be illuminated to a level not less than 1 footcandle (11 lux) at the walking surface.~~))

[S] 1008.3 ((~~Emergency power~~)) Power supply for illumination. The power supply for means of egress illumination shall normally be provided by the premises' electrical supply.

1008.3.1 General. In the event of power supply failure in rooms and spaces that require two or more means of egress, an emergency ((~~electrical~~)) power system shall automatically illuminate all of the following areas:

1. *Aisles.*
2. *Corridors.*
3. *Exit access stairways* and *ramps.*

1008.3.2 Buildings. In the event of power supply failure in buildings that require two or more *means of egress*, an emergency electrical system shall automatically illuminate all of the following areas:

1. *Interior exit access stairways* and *ramps*.
2. *Interior* and *exterior exit stairways* and *ramps*.
3. *Exit passageways.*
4. Vestibules and areas on the level of discharge used for *exit discharge* in accordance with Section 1028.1.
5. Exterior landings as required by Section 1010.1.6 for *exit doorways* that lead directly to the e*xit discharge*.

1008.3.3 Rooms and spaces. In the event of power supply failure, an emergency electrical system shall automatically illuminate all of the following areas:

1. Electrical equipment rooms.
2. Fire command centers.
3. Fire pump rooms.
4. Generator rooms.
5. Public restrooms with an area greater than 300 square feet (27.87 m^2).

1008.3.4 Duration. The emergency power system shall provide power for a duration of not less than 90 minutes and shall consist of storage batteries, unit equipment or an on-site generator. The installation of the emergency power system shall be in accordance with Section 2702.

1008.3.5 Illumination level under emergency power. Emergency lighting facilities shall be arranged to provide initial illumination that is not less than an average of 1 footcandle (11 lux) and a minimum at any point of 0.1 footcandle (1 lux) measured along the path of egress at floor level. Illumination levels shall be permitted to decline to 0.6 footcandle (6 lux) average and a minimum at any point of 0.06 footcandle (0.6 lux) at the end of the emergency lighting time duration. A maximum-to-minimum illumination uniformity ratio of 40 to 1 shall not be exceeded. In Group I-2 occupancies, failure of a single lamp in a luminaire shall not reduce the illumination level to less than 0.2 footcandle (2.2 lux).

SECTION 1009
ACCESSIBLE MEANS OF EGRESS

[W] 1009.1 Accessible means of egress required. *Accessible means of egress* shall comply with this section. *Accessible* spaces shall be provided with not less than one *accessible means of egress*. Where more than one *means of egress* is required by Section

1006.2 or 1006.3 from any *accessible* space, each *accessible* portion of the space shall be served by not less than two *accessible means of egress*.

Exceptions:

1. Accessible means of egress are not required to be provided in existing buildings.

((~~1~~)) 2. One *accessible means of egress* is required from an *accessible mezzanine* level in accordance with Section 1009.3, 1009.4 or 1009.5.

((~~2~~)) 3. In assembly areas with ramped *aisles* or stepped *aisles*, one *accessible means of egress* is permitted where the *common path of egress travel* is *accessible* and meets the requirements in Section 1029.8.

4. In parking garages, accessible *means of egress* are not required to serve parking areas that do not contain accessible parking spaces.

1009.2 Continuity and components. Each required *accessible means of egress* shall be continuous to a *public way* and shall consist of one or more of the following components:

1. *Accessible routes* complying with Section 1104.
2. *Interior exit stairways* complying with Sections 1009.3 and 1023.
3. *Exit access stairways* complying with Sections 1009.3 and 1019.3 or 1019.4.
4. *Exterior exit stairways* complying with Sections 1009.3 and 1027 and serving levels other than the *level of exit discharge*.
5. Elevators complying with Section 1009.4.

Interpretation I1009.2a: An *exit passageway* is not required on the level of exit discharge to connect the elevator with the exterior exit door.

6. Platform lifts complying with Section 1009.5.
7. *Horizontal exits* complying with Section 1026.
8. *Ramps* complying with Section 1012.
9. *Areas of refuge* complying with Section 1009.6.
10. Exterior areas for assisted rescue complying with Section 1009.7 serving exits at the *level of exit discharge*.

[W] 1009.2.1 Elevators required. In buildings where a required *accessible* floor or accessible occupied roof is four or more *stories* above or below a *level of exit discharge*, not less than one required *accessible means of egress* shall be an elevator complying with Section 1009.4.

Interpretation I1009.2b: The level of exit discharge is not counted when determining whether an accessible floor is four *stories* above or below a level of exit discharge. See Figure 1009.2.b.

Exceptions:

1. In buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required on floors provided with a *horizontal exit* and located at or above the *levels of exit discharge.*
2. In buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required on floors provided with a *ramp* conforming to the provisions of Section 1012.

Interpretation I1009.2c: In exception 2, the ramp shall be part of an accessible *means of egress.*

1009.3 Stairways. In order to be considered part of an *accessible means of egress*, a *stairway* between *stories* shall comply with Sections 1009.3.1 through 1009.3.3.

1009.3.1 Exit access stairways. *Exit access stairways* that connect levels in the same *story* are not permitted as part of an *accessible means of egress*.

Exception: *Exit access stairways* providing *means of egress* from *mezzanines* are permitted as part of an *accessible means of egress*.

1009.3.2 Stairway width. *Stairways* shall have a clear width of 48 inches (1219 mm) minimum between *handrails*.

Exceptions:

1. The clear width of 48 inches (1219 mm) between *handrails* is not required in buildings equipped throughout with an *automatic sprinkler* system installed in accordance with Section 903.3.1.1 or 903.3.1.2.
2. The clear width of 48 inches (1219 mm) between *handrails* is not required for *stairways* accessed from a refuge area in conjunction with a *horizontal exit.*

1009.3.3 Area of refuge. *Stairways* shall either incorporate an *area of refuge* within an enlarged floor-level landing or shall be accessed from an *area of refuge* complying with Section 1009.6.

Exceptions:

1. *Areas of refuge* are not required at *exit access stairways* where two-way communication is provided at the elevator landing in accordance with Section 1009.8.
2. *Areas of refuge* are not required at *stairways* in buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2.
3. *Areas of refuge* are not required at *stairways* serving *open parking garages.*
4. *Areas of refuge* are not required for *smoke-protected* or *open-air assembly seating* areas complying with Sections 1029.6.2 and 1029.6.3.
5. *Areas of refuge* are not required at *stairways* in Group R-2 occupancies.
6. *Areas of refuge* are not required for *stairways* accessed from a refuge area in conjunction with a *horizontal exit*.

[S] 1009.4 Elevators. In order to be considered part of an *accessible means of egress*, an elevator shall comply with Sections 1009.4.1 and 1009.4.2.

1009.4.1 Standby power. The elevator shall meet the emergency operation and signaling device requirements of Section 2.27 of ASME A17.1/CSA B44. ((~~Standby~~)) An emergency or *legally required standby power system* shall be provided in accordance with Chapter 27 and ((~~Section 3003~~)) the Seattle Electrical Code for the operation of the elevator, the shunt trip and lighting for elevator cars, control rooms, machine rooms, and machinery spaces.

1009.4.2 Area of refuge. The elevator shall be accessed from an *area of refuge* complying with Section 1009.6.

Exceptions:

1. *Areas of refuge* are not required at the elevator in *open parking garages*.
2. *Areas of refuge* are not required in buildings and facilities equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2.
3. *Areas of refuge* are not required at elevators not required to be located in a shaft in accordance with Section 712.
4. *Areas of refuge* are not required at elevators serving *smoke-protected* or *open-air assembly seating* areas complying with Sections 1029.6.2 and 1029.6.3.
5. *Areas of refuge* are not required for elevators accessed from a refuge area in conjunction with a *horizontal exit*.

[S] 1009.5 Platform lifts. Platform lifts shall be permitted to serve as part of an *accessible means of egress* where allowed as part of a required *accessible route* in Section 1109.8 except for Item 10. ((~~Standby~~)) A *legally required standby power system* for the platform lift shall be provided in accordance with Chapter 27.

1009.6 Areas of refuge. Every required *area of refuge* shall be accessible from the space it serves by an *accessible means of egress*.

1009.6.1 Travel distance. The maximum travel distance from any *accessible* space to an *area of refuge* shall not exceed the *exit access* travel distance permitted for the occupancy in accordance with Section 1017.1.

1009.6.2 Stairway or elevator access. Every required *area of refuge* shall have direct access to a *stairway* complying with Sections 1009.3 and 1023 or an elevator complying with Section 1009.4.

1009.6.3 Size. Each *area of refuge* shall be sized to accommodate one *wheelchair space* of 30 inches by 48 inches (762 mm by 1219 mm) for each 200 occupants or portion thereof, based on the *occupant load* of the *area of refuge* and areas served by the *area of refuge*. Such *wheelchair spaces* shall not reduce the *means of egress* minimum width or required capacity. Access to any of the required *wheelchair spaces* in an *area of refuge* shall not be obstructed by more than one adjoining *wheelchair space*.

1009.6.4 Separation. Each *area of refuge* shall be separated from the remainder of the story by a *smoke barrier* complying with Section 709 or a *horizontal* exit complying with Section 1026. Each *area of refuge* shall be designed to minimize the intrusion of smoke.

Exceptions:

1. *Areas of refuge* located within an enclosure for *interior exit stairways* complying with Section 1023.
2. *Areas of refuge* in outdoor facilities where *exit access* is essentially open to the outside.

1009.6.5 Two-way communication. *Areas of refuge* shall be provided with a two-way communication system complying with Sections 1009.8.1 and 1009.8.2.

1009.7 Exterior areas for assisted rescue. Exterior areas for assisted rescue shall be accessed by an *accessible route* from the area served.

Where the *exit discharge* does not include an *accessible route* from an *exit* located on the *level of exit discharge* to a *public way*, an exterior area of assisted rescue shall be provided on the exterior landing in accordance with Sections 1009.7.1 through 1009.7.4.

1009.7.1 Size. Each exterior area for assisted rescue shall be sized to accommodate *wheelchair spaces* in accordance with Section 1009.6.3.

1009.7.2 Separation. Exterior walls separating the exterior area of assisted rescue from the interior of the building shall have a minimum *fire-resistance rating* of 1 hour, rated for exposure to fire from the inside. The fire-resistance-rated exterior wall construction shall extend horizontally not less than 10 feet (3048 mm) beyond the landing on either side of the landing or equivalent fire-resistance-rated construction is permitted to extend out perpendicular to the exterior wall not less than 4 feet (1220 mm) on the side of the landing. The *fire-resistance-rated* construction shall extend vertically from the ground to a point not less than 10 feet (3048 mm) above the floor level of the area for assisted rescue or to the roof line, whichever is lower. Openings within such *fire-resistance-rated* exterior walls shall be protected in accordance with Section 716.

Exception: The *fire-resistance rating* and opening protectives are not required in the exterior wall where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2.

1009.7.3 Openness. The exterior area for assisted rescue shall be open to the outside air. The sides other than the separation walls shall be not less than 50 percent open, and the open area shall be distributed so as to minimize the accumulation of smoke or toxic gases.

1009.7.4 Stairways. *Stairways* that are part of the *means of egress* for the exterior area for assisted rescue shall provide a minimum clear width of 48 inches (1220 mm) between *handrails*.

Exception: The minimum clear width of 48 inches (1220 mm) between *handrails* is not required at *stairways* serving buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2.

[W] 1009.8 Two-way communication. A two-way communication system complying with Sections 1009.8.1 and 1009.8.2 shall be provided at the landing serving each elevator or bank of elevators on each accessible floor that is one or more stories above or below the *level of exit discharge*.

Exceptions:

1. Two-way communication systems are not required at the landing serving each elevator or bank of elevators where the two-way communication system is provided within *areas of refuge* in accordance with Section 1009.6.5.
2. Two-way communication systems are not required on floors provided with *ramps* conforming to the provisions of Section 1012.
3. Two-way communication systems are not required at the landings serving only service elevators that are not designated as part of the *accessible means of egress* or serve as part of the required *accessible route* into a facility.
4. Two-way communication systems are not required at the landings serving only freight elevators.
5. Two-way communication systems are not required at the landing serving a private residence elevator.
6. Two-way communication systems are not required in Group I-2 or I-3 facilities.

[S] 1009.8.1 System requirements. Two-way communication systems shall provide communication between each required location and the *fire command center* or a central control point location *approved* by the fire department. Where the central control point is not a *constantly attended location*, a two-way communication system shall have a timed automatic telephone dial-out capability to a monitoring location. ((~~or 9-1-1.~~)) The two-way communication system shall include both audible and visible signals. The two-way communication system shall have a battery backup or an *approved* alternate source of power that is capable of 90 minutes' use upon failure of the normal power source.

1009.8.2 Directions. Directions for the use of the two-way communication system, instructions for summoning assistance via the two-way communication system and written identification of the location shall be posted adjacent to the two-way communication system. Signage shall comply with the ICC A117.1 requirements for visual characters.

1009.9 Signage. Signage indicating special accessibility provisions shall be provided as shown:

1. Each door providing access to an *area of refuge* from an adjacent floor area shall be identified by a sign stating: AREA OF REFUGE.
2. Each door providing access to an exterior area for assisted rescue shall be identified by a sign stating: EXTERIOR AREA FOR ASSISTED RESCUE.

Signage shall comply with the *ICC A117.1* requirements for visual characters and include the International Symbol of Accessibility. Where exit sign illumination is required by Section 1013.3, the signs shall be illuminated. Additionally, visual characters, raised character and braille signage complying with ICC A117.1 shall be located at each door to an *area of refuge* and exterior area for assisted rescue in accordance with Section 1013.4.

1009.10 Directional signage. Directional signage indicating the location of all other *means of egress* and which of those are *accessible means of egress* shall be provided at the following:

1. At *exits* serving a required *accessible* space but not providing an approved *accessible means of egress*.
2. At elevator landings.
3. Within *areas of refuge*.

1009.11 Instructions. In *areas of refuge* and exterior areas for assisted rescue, instructions on the use of the area under emergency conditions shall be posted. Signage shall comply with the ICC A117.1 requirements for visual characters. The instructions shall include all of the following:

1. Persons able to use the *exit stairway* do so as soon as possible, unless they are assisting others.
2. Information on planned availability of assistance in the use of *stairs* or supervised operation of elevators and how to summon such assistance.
3. Directions for use of the two-way communication system where provided.

SECTION 1010
DOORS, GATES AND TURNSTILES

[S] 1010.1 Doors. *Means of egress* doors shall meet the requirements of this section. Doors serving a *means of egress* system shall meet the requirements of this section and Section 1022.2. Doors provided for egress purposes in numbers greater than required by this code shall meet the requirements of this section. See Section 3201 for doors swinging over public property.

Means of egress doors shall be readily distinguishable from the adjacent construction and finishes such that the doors are easily recognizable as doors. Mirrors or similar reflecting materials shall not be used on *means of egress* doors. *Means of egress* doors shall not be concealed by curtains, drapes, decorations or similar materials.

1010.1.1 Size of doors. The required capacity of each door opening shall be sufficient for the *occupant load* thereof and shall provide a minimum clear opening width of 32 inches (813 mm). The clear opening width of doorways with swinging doors shall be measured between the face of the door and the stop, with the door open 90 degrees (1.57 rad). Where this section requires a minimum clear opening width of 32 inches (813 mm) and a door opening includes two door leaves without a mullion, one leaf shall provide a minimum clear opening width of 32 inches (813 mm). In Group I-2, doors serving as *means of egress* doors where used for the movement of beds shall provide a minimum clear opening width of 41-1/2 inches (1054 mm). The maximum width of a swinging door leaf shall be 48 inches (1219 mm) nominal. The minimum clear opening height of doors shall be not less than 80 inches (2032 mm).

Exceptions:

1. In Group R-2 and R-3 *dwelling* and *sleeping units* that are not required to be an Accessible unit, Type A unit or Type B unit, the minimum and maximum width shall not apply to door openings that are not part of the required *means of egress.*
2. In Group I-3, door openings to resident *sleeping units* that are not required to be an Accessible unit shall have a minimum clear opening width of 28 inches (711 mm).
3. Door openings to storage closets less than 10 square feet (0.93 m^2) in area shall not be limited by the minimum clear opening width.
4. The width of door leaves in revolving doors that comply with Section 1010.1.4.1 shall not be limited.
5. The maximum width of door leaves in *power-operated doors* that comply with Section 1010.1.4.2 shall not be limited.
6. Door openings within a *dwelling unit* or *sleeping unit* shall have a minimum clear opening height of 78 inches (1981 mm).

1010.1.4.2 Power-operated doors. Where *means of egress* doors are operated or assisted by power, the design shall be such that in the event of power failure, the door is capable of being opened manually to permit *means of egress* travel or closed where necessary to safeguard *means of egress*. The forces required to open these doors manually shall not exceed those specified in Section 1010.1.3, except that the force to set the door in motion shall not exceed 50 pounds (220 N). The door shall be capable of opening from any position to the full width of the opening in which such door is installed when a force is applied to the door on the side from which egress is made. Power-operated swinging doors, power-operated sliding doors and power-operated folding doors shall comply with BHMA A156.10. Power-assisted swinging doors and low-energy power-operated swinging doors shall comply with BHMA A156.19. Low-energy *power-operated* sliding *doors* and low-energy *power-operated* folding *doors* shall comply with BHMA A156.38.

Exceptions:

1. Occupancies in Group I-3.
2. Special purpose horizontal sliding, accordion or folding doors complying with Section 1010.1.4.3.
3. For a biparting door in the emergency breakout mode, a door leaf located within a multiple-leaf opening shall be exempt from the minimum 32-inch (813 mm) single-leaf requirement of Section 1010.1.1, provided that a minimum 32-inch (813 mm) clear opening is provided when the two biparting leaves meeting in the center are broken out.

1010.1.4.3 Special purpose horizontal sliding, accordion or folding doors. In other than Group H occupancies, special purpose horizontal sliding, accordion or folding door assemblies permitted to be a component of a *means of egress* in accordance with Exception 6 to Section 1010.1.2 shall comply with all of the following criteria:

1. The doors shall be power operated and shall be capable of being operated manually in the event of power failure.
2. The doors shall be openable by a simple method from both sides without special knowledge or effort.
3. The force required to operate the door shall not exceed 30 pounds (133 N) to set the door in motion and 15 pounds (67 N) to close the door or open it to the minimum required width.
4. The door shall be openable with a force not to exceed 15 pounds (67 N) when a force of 250 pounds (1100 N) is applied perpendicular to the door adjacent to the operating device.
5. The door assembly shall comply with the applicable *fire protection rating* and, where rated, shall be self-closing or automatic closing by smoke detection in accordance with Section 716.2.6.6, shall be installed in accordance with NFPA 80 and shall comply with Section 716.
6. The door assembly shall have an integrated standby power supply.
7. The door assembly power supply shall be electrically supervised.
8. The door shall open to the minimum required width within 10 seconds after activation of the operating device.

1010.1.4.4 Locking arrangements in educational occupancies. In Group E and Group B educational occupancies, egress doors from classrooms, offices and other occupied rooms shall be permitted to be provided with locking arrangements designed to keep intruders from entering the room where all of the following conditions are met:

1. The door shall be capable of being unlocked from outside the room with a key or other approved means.
2. The door shall be openable from within the room in accordance with Section 1010.1.9.
3. Modifications shall not be made to listed *panic hardware*, fire door hardware or door closers.

1010.1.4.4.1 Remote operation of locks. Remote operation of locks complying with Section 1010.1.4.4 shall be permitted.

1010.1.4.5 Security grilles. In Groups B, F, M and S, horizontal sliding or vertical security grilles are permitted at the main *exit* and shall be openable from the inside without the use of a key or special knowledge or effort during periods that the space is occupied. The grilles shall remain secured in the full-open position during the period of occupancy by the general public. Where two or more *means of egress* are required, not more than one-half of the *exits* or *exit access doorways* shall be equipped with horizontal sliding or vertical security grilles.

[S] 1010.1.5 Floor elevation. There shall be a floor or landing on each side of a door. Such floor or landing shall be at the same elevation on each side of the door. Landings shall be level except for exterior landings, which are permitted to have a slope not to exceed 0.25 unit vertical in 12 units horizontal (2-percent slope).

Exceptions:

1. Doors serving individual *dwelling units* in Groups R-2 and R-3 where the following apply:
   1.1. A door is permitted to open at the top step of ((~~an interior~~)) a *flight* of *stairs*, provided that the door does not swing over the top step.
   1.2. Screen doors and storm doors are permitted to swing over *stairs* or landings.

2. Exterior doors as provided for in Section 1003.5, Exception 1, and Section 1022.2, which are not on an *accessible route*.
3. In Group R-3 occupancies not required to be *Accessible units*, *Type A units* or *Type B units*, the landing at an exterior doorway shall be not more than 7-3/4 inches (197 mm) below the top of the threshold, provided the door, other than an exterior storm or screen door, does not swing over the landing.
4. Variations in elevation due to differences in finish materials, but not more than 1/2 inch (12.7 mm).
5. Exterior decks, patios or balconies that are part of *Type B dwelling units*, have impervious surfaces and that are not more than 4 inches (102 mm) below the finished floor level of the adjacent interior space of the dwelling unit.
6. Doors serving equipment spaces not required to be *accessible* in accordance with Section 1103.2.9 and serving an occupant load of five or less shall be permitted to have a landing on one side to be not more than 7 inches (178 mm) above or below the landing on the egress side of the door.

[S] 1010.1.6 Landings at doors. Landings shall have a width not less than the width of the *stairway* or the door, whichever is greater. Doors in the fully open position shall not reduce a required dimension by more than 7 inches (178 mm). Where a landing serves an *occupant load* of 50 or more, doors in any position shall not reduce the landing to less than one-half its required width. When doors open over landings, doors in any position shall not reduce the landing length to less than 12 inches (305 mm). Landings shall have a length measured in the direction of travel of not less than 44 inches (1118 mm).

Exception: Landing length in the direction of travel in Groups R-3 and U and within individual units of Group R-2 need not exceed 36 inches (914 mm).

Interpretation I1010.1.6: Landing length, width and slope shall be measured as specified in Section 1011.6 and 1011.7.1. See Figures 1010.1.6(1), 1010.1.6(2) and 1010.1.6(3) for illustrations of the requirements of this section.

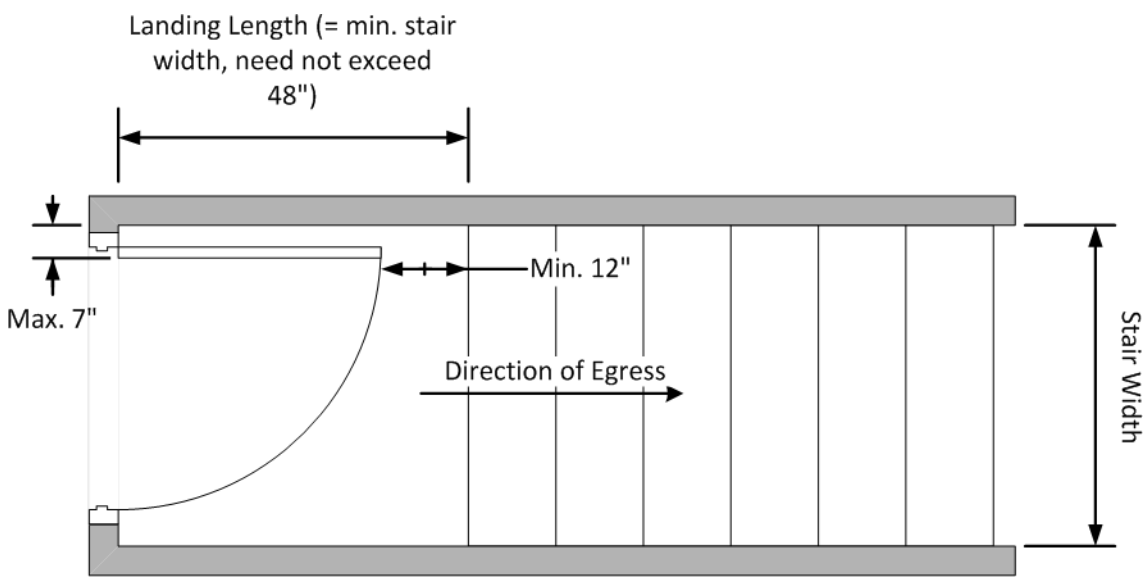


Figure 1010.1.6(1)
Landing dimensions only

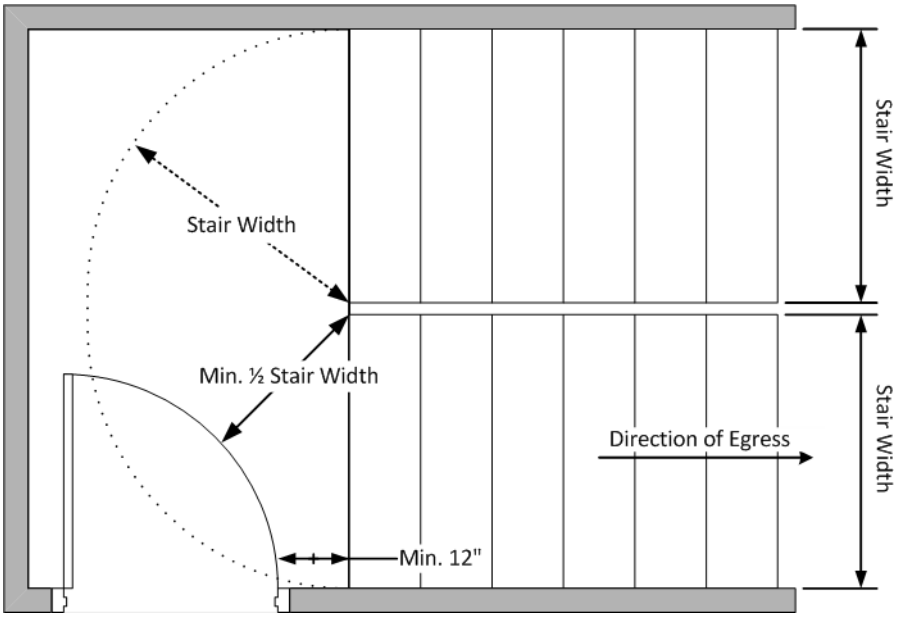


Figure 1010.1.6(2)
Landing dimensions only

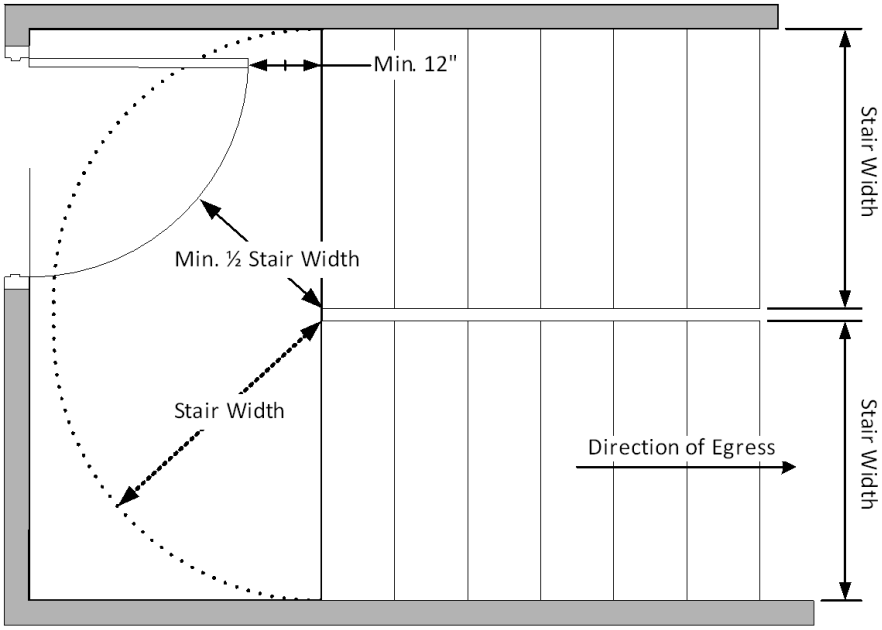


Figure 1010.1.6(3)
Landing dimensions only

1010.1.7 Thresholds. Thresholds at doorways shall not exceed 3/4 inch (19.1 mm) in height above the finished floor or landing for sliding doors serving *dwelling units* or 1/2 inch (12.7 mm) above the finished floor or landing for other doors. Raised thresholds and floor level changes greater than 1/4 inch (6.4 mm) at doorways shall be beveled with a slope not greater than one unit vertical in two units horizontal (50-percent slope).

Exceptions:

1. In occupancy Group R-2 or R-3, threshold heights for sliding and side-hinged exterior doors shall be permitted to be up to 7-3/4 inches (197 mm) in height if all of the following apply:
    1.1. The door is not part of the required *means of egress*.

1.2. The door is not part of an *accessible route* as required by Chapter 11.

1.3. The door is not part of an *Accessible unit*, *Type A unit* or *Type B unit*.

2. In *Type B units*, where Exception 5 to Section 1010.1.5 permits a 4-inch (102 mm) elevation change at the door, the threshold height on the exterior side of the door shall not exceed 4-3/4 inches (120 mm) in height above the exterior deck, patio or balcony for sliding doors or 4-1/2 inches (114 mm) above the exterior deck, patio or balcony for other doors.

1010.1.8 Door arrangement. Space between two doors in a series shall be 48 inches (1219 mm) minimum plus the width of a door swinging into the space. Doors in a series shall swing either in the same direction or away from the space between the doors.

Exceptions:

1. The minimum distance between horizontal sliding power-operated doors in a series shall be 48 inches (1219 mm).
2. Storm and screen doors serving individual *dwelling units* in Groups R-2 and R-3 need not be spaced 48 inches (1219 mm) from the other door.
3. Doors within individual *dwelling units* in Groups R-2 and R-3 other than within *Type A dwelling units*.

1010.1.9 Door operations. Except as specifically permitted by this section, egress doors shall be readily openable from the egress side without the use of a key or special knowledge or effort.

Note: Stairway doors shall also comply with Section 1010.1.9.11.

1010.1.9.1 Hardware. Door handles, pulls, latches, locks and other operating devices on doors required to be *accessible* by Chapter 11 shall not require tight grasping, tight pinching or twisting of the wrist to operate.

1010.1.9.2 Hardware height. Door handles, pulls, latches, locks and other operating devices shall be installed 34 inches (864 mm) minimum and 48 inches (1219 mm) maximum above the finished floor. Locks used only for security purposes and not used for normal operation are permitted at any height.

Exception: Access doors or gates in barrier walls and fences protecting pools, spas and hot tubs shall be permitted to have operable parts of the latch release on self-latching devices at 54 inches (1370 mm) maximum above the finished floor or ground, provided that the self-latching devices are not also self-locking devices operated by means of a key, electronic opener or integral combination lock.

1010.1.9.3 Monitored or recorded egress. Where electrical systems that monitor or record egress activity are incorporated, the locking system shall comply with Section 1010.1.9.7, 1010.1.9.8, 1010.1.9.9, 1010.1.9.10 or 1010.1.9.11 or shall be readily openable from the egress side without the use of a key or special knowledge or effort.

[W][S] 1010.1.9.4 Locks and latches. Locks and latches shall be permitted to prevent operation of doors where any of the following exist:

1. Places of detention or restraint as *approved by the building official*.
2. In buildings in occupancy Group A having an *occupant load* of 300 or less, Groups B, F, M and S, and in *places of religious worship*, the main door or doors are permitted to be equipped with key-operated locking devices from the egress side provided:

   2.1. The locking device is readily distinguishable as locked.

   2.2. A readily visible durable sign is posted on the egress side on or adjacent to the door stating: THIS DOOR TO REMAIN UNLOCKED ((~~WHEN THIS SPACE IS OCCUPIED~~)) DURING BUSINESS HOURS. The sign shall be in letters 1 inch (25 mm) high on a contrasting background.

   2.3. The use of the key-operated locking device is revocable by the *building official* for due cause.
3. Where egress doors are used in pairs, *approved* automatic flush bolts shall be permitted to be used, provided that the door leaf having the automatic flush bolts does not have a doorknob or surface-mounted hardware on the egress side of the door.
4. Doors from individual *dwelling* or *sleeping units* of Group R occupancies having an *occupant load* of 10 or less are permitted to be equipped with a night latch, dead bolt or security chain, provided such devices are openable from the inside without the use of a key or tool.
5. *Fire doors* after the minimum elevated temperature has disabled the unlatching mechanism in accordance with *listed fire door* test procedures.
6. Doors serving roofs not intended to be occupied shall be permitted to be locked preventing entry to the building from the roof.

7. *Approved*, listed locks without delayed egress shall be permitted in Group I-1 condition 2 assisted living facilities licensed by the state of Washington, provided that:
   7.1. The clinical needs of one or more patients require specialized security measures for their safety.
   7.2. The doors unlock upon actuation of the *automatic sprinkler system* or automatic *fire detection system.*
   7.3. The doors unlock upon loss of electrical power controlling the lock or lock mechanism.
   7.4. The lock shall be capable of being deactivated by a signal from a switch located in an *approved* location.
   7.5. There is a system, such as a keypad and code, in place that allows visitors, staff persons and appropriate residents to exit. Instructions for exiting shall be posted within six feet of the door.
8. Other than egress courts, where occupants must egress from an exterior space through the building for means of egress, exit access doors shall be permitted to be equipped with an approved locking device where installed and operated in accordance with all of the following:
   8.1. The occupant load of the occupied exterior area shall not exceed 300 as determined by IBC Section 1004.
   8.2. The maximum occupant load shall be posted where required by Section 1004.9. Such sign shall be permanently affixed inside the building and shall be posted in a conspicuous space near all the exit access doorways.
   8.3. A weatherproof telephone or two-way communication system installed in accordance with Sections 1009.8.1 and 1009.8.2 shall be located adjacent to not less than one required exit access door on the exterior side.
   8.4. The egress door locking device is readily distinguishable as locked and shall be a key-operated locking device.
   8.5. A clear window or glazed door opening, not less than 5 square feet (0.46 m^2) sq. ft. in area, shall be provided at each exit access door to determine if there are occupants using the outdoor area.
   8.6. A readily visible durable sign shall be posted on the interior side on or adjacent to each locked required exit access door serving the exterior area stating: THIS DOOR TO REMAIN UNLOCKED WHEN THE OUTDOOR AREA IS OCCUPIED. The letters on the sign shall be not less than 1 inch high on a contrasting background.
9. Locking devices are permitted on doors to balconies, decks or other exterior spaces serving individual dwelling or sleeping units.
10. Locking devices are permitted on doors to balconies, decks or other exterior spaces of 250 square feet or less, serving a private office space.
11. Doors from elevator lobbies providing access to exits are permitted to be locked during or after business hours where items 11.1 through 11.5 are satisfied.
   11.1. The lobby doors shall unlock automatically upon fire alarm.
   11.2. The lobby doors shall unlock automatically upon power loss.
   11.3. The alarm system shall include smoke detection in the elevator lobby and at least two detectors on the tenant side within 15 feet of the door;
   11.4. Access through the tenant portion of the building to both exits shall be unobstructed; and
   11.5. The building shall have an *automatic sprinkler system* throughout in accordance with Section 903.3.1.1 or 903.3.1.2.

[S] 1010.1.9.5 Bolt locks. Manually operated flush bolts or surface bolts are not permitted.

Exceptions:

1. On doors not required for egress in individual *dwelling units* or *sleeping units*.
2. Where a pair of doors serves a storage or equipment room, manually operated edge- or surface-mounted bolts or self-latching flush bolts are permitted on the inactive leaf.
3. Where a pair of doors serves an *occupant load* of less than 50 persons in a Group B, F or S occupancy, manually operated edge- or surface-mounted bolts are permitted on the inactive leaf. The inactive leaf shall not contain doorknobs, panic bars or similar operating hardware.
4. Where a pair of doors serves a Group B, F or S occupancy, manually operated edge- or surface-mounted bolts are permitted on the inactive leaf provided that such inactive leaf is not needed to meet egress capacity requirements and the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1. The inactive leaf shall not contain doorknobs, panic bars or similar operating hardware.

5. Where a pair of doors serves patient care rooms in Group I-2 occupancies, self-latching edge- or surface-mounted bolts are permitted on the inactive leaf provided that the inactive leaf is not needed to meet egress capacity requirements and the inactive leaf shall not contain doorknobs, panic bars or similar operating hardware.

1010.1.9.6 Unlatching. The unlatching of any door or leaf shall not require more than one operation.

Exceptions:

1. Places of detention or restraint.
2. Where manually operated bolt locks are permitted by Section 1010.1.9.5.
3. Doors with automatic flush bolts as permitted by Section 1010.1.9.4, Item 3.
4. Doors from individual *dwelling units* and *sleeping units* of Group R occupancies as permitted by Section 1010.1.9.4, Item 4.

1010.1.9.6.1 Closet doors. Closet doors that latch in the closed position shall be openable from inside the closet.

[W][S] 1010.1.9.7 Controlled egress doors in Groups I-1 and I-2. Electric locking systems, including electro-mechanical locking systems and electromagnetic locking systems, shall be permitted to be locked in the means of egress in Group I-1 or I-2 occupancies where the clinical needs of persons receiving care require their containment. Controlled egress doors shall be permitted in such occupancies where the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or an *approved automatic smoke* or *heat detection system* installed in accordance with Section 907, provided that the doors are installed and operate in accordance with all of the following:

1. The door locks shall unlock on actuation of the *automatic sprinkler system* or *automatic fire detection system*.
2. The door locks shall unlock on loss of power controlling the lock or lock mechanism.
3. The door locking system shall be installed to have the capability of being unlocked by a switch located at the *fire command center*, a nursing station or other approved location. The switch shall directly break power to the lock.
4. A building occupant shall not be required to pass through more than one door equipped with a controlled egress locking system before entering an exit.
5. The procedures for unlocking the doors shall be described and approved as part of the emergency planning and preparedness required by Chapter 4 of the *International Fire Code*.

((~~6. All clinical staff shall have the keys, codes or other means necessary to operate the locking systems.~~))

6. There is a system, such as a keypad and code, in place that allows visitors, staff persons and appropriate residents to exit. Instructions for exiting shall be posted within six feet of the door.
7. Emergency lighting shall be provided at the door.
8. The door locking system units shall be *listed* in accordance with UL 294.

Exceptions:

1. Items 1 through 4 and 6 shall not apply to doors to areas ((~~occupied by~~)) where persons ((~~who~~)) which, because of clinical needs, require restraint or containment as part of the function of a psychiatric treatment area provided that all clinical staff shall have the keys, codes or other means necessary to operate the locking devices.
2. Items 1 through 4 shall not apply to doors to areas where a *listed* egress control system is utilized to reduce the risk of child abduction from nursery and obstetric areas of a Group I-2 hospital.

[S] 1010.1.9.8 Delayed egress. Delayed egress locking systems shall be permitted to be installed on doors serving the following occupancies in buildings that are equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or an *approved automatic smoke* or *heat detection system* installed in accordance with Section 907. Delayed egress locks are permitted in libraries in both Group A and E occupancies in locations other than at main exit doors, and in Group E day care occupancies.

1. Group B, F, I, M, R, S and U occupancies.
2. Group E classrooms with an occupant load of less than 50.

Exception: Delayed egress locking systems shall be permitted to be installed on *exit* or *exit access* doors, other than the main *exit* or *exit access* door, serving a courtroom in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

1010.1.9.8.1 Delayed egress locking system. The delayed egress locking system shall be installed and operated in accordance with all of the following:

1. The delay electronics of the delayed egress locking system shall deactivate upon actuation of the *automatic sprinkler system* or *automatic fire detection system*, allowing immediate free egress.

2. The delay electronics of the delayed egress locking system shall deactivate upon loss of power controlling the lock or lock mechanism, allowing immediate free egress.
3. The delayed egress locking system shall have the capability of being deactivated at the f*ire command center* and other *approved* locations.
4. An attempt to egress shall initiate an irreversible process that shall allow such egress in not more than 15 seconds when a physical effort to exit is applied to the egress side door hardware for not more than 3 seconds. Initiation of the irreversible process shall activate an audible signal in the vicinity of the door. Once the delay electronics have been deactivated, rearming the delay electronics shall be by manual means only.

   Exception: Where approved, a delay of not more than 30 seconds is permitted on a delayed egress door.
5. The egress path from any point shall not pass through more than one delayed egress locking system.

   Exceptions:

   1. In Group I-2 or I-3 occupancies, the egress path from any point in the building shall pass through not more than two delayed egress locking systems provided that the combined delay does not exceed 30 seconds.
   2. In Group I-1 or I-4 occupancies, the egress path from any point in the building shall pass through not more than two delayed egress locking systems provided the combined delay does not exceed 30 seconds and the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.
6. A sign shall be provided on the door and shall be located above and within 12 inches (305 mm) of the door exit hardware:

   6.1. For doors that swing in the direction of egress, the sign shall read: PUSH UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 [30] SECONDS.

   6.2. For doors that swing in the opposite direction of egress, the sign shall read: PULL UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 [30] SECONDS.

   6.3. The sign shall comply with the visual character requirements in ICC A117.1.

   Exception: Where approved, in Group I occupancies, the installation of a sign is not required where care recipients who because of clinical needs require restraint or containment as part of the function of the treatment area.
7. Emergency lighting shall be provided on the egress side of the door.
8. The delayed egress locking system units shall be *listed* in accordance with UL 294.

1010.1.9.9 Sensor release of electrically locked egress doors. Sensor release of electric locking systems shall be permitted on doors located in the *means of egress* in any occupancy except Group H where installed and operated in accordance with all of the following criteria:

1. The sensor shall be installed on the egress side, arranged to detect an occupant approaching the doors, and shall cause the electric locking system to unlock.
2. The electric locks shall be arranged to unlock by a signal from or loss of power to the sensor.
3. Loss of power to the lock or locking system shall automatically unlock the electric locks.
4. The doors shall be arranged to unlock from a manual unlocking device located 40 inches to 48 inches (1016 mm to 1219 mm) vertically above the floor and within 5 feet (1524 mm) of the secured doors. Ready access shall be provided to the manual unlocking device and the device shall be clearly identified by a sign that reads “PUSH TO EXIT.” When operated, the manual unlocking device shall result in direct interruption of power to the electric lock—independent of other electronics—and the electric lock shall remain unlocked for not less than 30 seconds.
5. Activation of the building *fire alarm system*, where provided, shall automatically unlock the electric lock, and the electric lock shall remain unlocked until the fire alarm system has been reset.
6. Activation of the building *automatic sprinkler system* or *fire detection system*, where provided, shall automatically unlock the electric lock. The electric lock shall remain unlocked until the *fire alarm system* has been reset.
7. The door locking system units shall be *listed* in accordance with UL 294.

[S] 1010.1.9.10 Door hardware release of electrically locked egress doors. Door hardware release of electric locking systems shall be permitted on doors in the *means of egress* in any occupancy except Group H where installed and operated in accordance with all of the following:

1. The door hardware ((~~that~~)) is affixed to the door leaf <u>and</u> has an obvious method of operation that is readily operated under all lighting conditions.

2. The door hardware is capable of being operated with one hand without special knowledge, keys or tools, and shall comply with Section 1010.1.9.6.
3. Operation of the door hardware directly interrupts the power to the electric lock and unlocks the door immediately.
4. Loss of power to the electric locking system automatically unlocks the door.
5. Where *panic* or *fire exit hardware* is required by Section 1010.1.10, operation of the *panic* or *fire exit hardware* also releases the electric lock.
6. The locking system units shall be *listed* in accordance with UL 294.

1010.1.9.11 Locking arrangements in buildings within correctional facilities. In *buildings* within correctional and detention facilities, doors in *means of egress* serving rooms or spaces occupied by persons whose movements are controlled for security reasons shall be permitted to be locked where equipped with egress control devices that shall unlock manually and by not less than one of the following means:

1. Activation of an *automatic sprinkler system* installed in accordance with Section 903.3.1.1.
2. Activation of an *approved manual fire alarm box*.
3. A signal from a *constantly attended location*.

[S] 1010.1.9.12 Stairway doors. Interior *stairway means of egress* doors shall be openable from both sides without the use of a key or special knowledge or effort.

Exceptions:

1. *Stairway* discharge doors shall be openable from the egress side and shall only be locked from the opposite side.
2. This section shall not apply to doors arranged in accordance with Section 403.5.3.
3. S*tairway* exit doors are permitted to be locked from the side opposite the egress side, provided that they are openable from the egress side and capable of being unlocked simultaneously without unlatching upon a signal from the *fire command center*, if present, or a signal by emergency personnel from a single location inside the main entrance to the building.
4. *Stairway exit* doors shall be openable from the egress side and shall only be locked from the opposite side in Group B, F, M and S occupancies where the only interior access to the tenant space is from a single *exit stairway* where permitted in Section 1006.3.3.
5. *Stairway exit* doors shall be openable from the egress side and shall only be locked from the opposite side in Group R-2 occupancies where the only interior access to the *dwelling unit* is from a single *exit stairway* where permitted in Section 1006.3.3.
6. In stairways serving more than four *stories* in non-high-rise buildings, doors are permitted to be locked from the side opposite the egress side, provided they are openable from the egress side and capable of being unlocked simultaneously without unlatching upon a signal from the fire command center, if present, or a signal by emergency personnel from a single location inside the main entrance to the building. A communication system that complies with Section 403.5.3.1 shall be provided.

[W][S] 1010.1.10 Panic and fire exit hardware. Swinging doors serving a Group H occupancy and swinging doors serving rooms or spaces with an *occupant load* of 50 or more in a Group A or E occupancy shall not be provided with a latch or lock other than *panic hardware* or *fire exit hardware*.

Exceptions:

1. A main *exit* of a Group A occupancy shall be permitted to have locking devices in accordance with Section 1010.1.9.4, Item 2.
2. Doors provided with *panic hardware* or *fire exit hardware* and serving a Group A or E occupancy shall be permitted to be electrically locked in accordance with Section 1010.1.9.9 or 1010.1.9.10.
3. Exit access doors serving occupied exterior areas shall be permitted to be locked in accordance with Section 1010.1.9.4, Item 7.

Electrical rooms with equipment rated ((~~1,200~~)) 800 amperes or more and over 6 feet (1829 mm) wide, and that contain overcurrent devices, switching devices or control devices with *exit* or *exit access doors*, shall be equipped with *panic hardware* or *fire exit hardware*. The doors shall swing in the direction of egress travel.

1010.1.10.1 Installation. Where *panic* or *fire exit hardware* is installed, it shall comply with the following:

1. *Panic hardware* shall be *listed* in accordance with UL 305.
2. *Fire exit hardware* shall be *listed* in accordance with UL 10C and UL 305.
3. The actuating portion of the releasing device shall extend not less than one-half of the door leaf width.

4. The maximum unlatching force shall not exceed 15 pounds (67 N).

1010.1.10.2 Balanced doors. If *balanced doors* are used and *panic hardware* is required, the *panic hardware* shall be the push-pad type and the pad shall not extend more than one-half the width of the door measured from the latch side.

1010.2 Gates. Gates serving the *means of egress* system shall comply with the requirements of this section. Gates used as a component in a *means of egress* shall conform to the applicable requirements for doors.

Exception: Horizontal sliding or swinging gates exceeding the 4-foot (1219 mm) maximum leaf width limitation are permitted in fences and walls surrounding a stadium.

1010.2.1 Stadiums. *Panic hardware* is not required on gates surrounding stadiums where such gates are under constant immediate supervision while the public is present, and where safe dispersal areas based on 3 square feet (0.28 m^2) per occupant are located between the fence and enclosed space. Such required safe dispersal areas shall not be located less than 50 feet (15 240 mm) from the enclosed space. See Section 1028.5 for *means of egress* from safe dispersal areas.

1010.3 Turnstiles and similar devices. Turnstiles or similar devices that restrict travel to one direction shall not be placed so as to obstruct any required *means of egress*, except where permitted in accordance with Sections 1010.3.1, 1010.3.2 and 1010.3.3.

1010.3.1 Capacity. Each turnstile or similar device shall be credited with a capacity based on not more than a 50-person *occupant load* where all of the following provisions are met:

1. Each device shall turn free in the direction of egress travel when primary power is lost and on the manual release by an employee in the area.
2. Such devices are not given credit for more than 50 percent of the required egress capacity or width.
3. Each device is not more than 39 inches (991 mm) high.
4. Each device has not less than 16-1/2 inches (419 mm) clear width at and below a height of 39 inches (991 mm) and not less than 22 inches (559 mm) clear width at heights above 39 inches (991 mm).

1010.3.1.1 Clear width. Where located as part of an *accessible route*, turnstiles shall have not less than 36 inches (914 mm) clear width at and below a height of 34 inches (864 mm), not less than 32 inches (813 mm) clear width between 34 inches (864 mm) and 80 inches (2032 mm) and shall consist of a mechanism other than a revolving device.

1010.3.2 Security access turnstiles. Security access turnstiles that inhibit travel in the direction of egress utilizing a physical barrier shall be permitted to be considered as a component of the *means of egress*, provided that all of the following criteria are met:

1. The *building* is protected throughout by an *automatic sprinkler system* in accordance with Section 903.3.1.1.
2. Each security access turnstile lane configuration has a minimum clear passage width of 22 inches (559 mm).
3. Any security access turnstile lane configuration providing a clear passage width of less than 32 inches (810 mm) shall be credited with a maximum egress capacity of 50 persons.
4. Any security access turnstile lane configuration providing a clear passage width of 32 inches (810 mm) or more shall be credited with a maximum egress capacity as calculated in accordance with Section 1005.
5. Each secured physical barrier shall automatically retract or swing to an unobstructed open position in the direction of egress, under each of the following conditions:
   - 5.1. Upon loss of power to the turnstile or any part of the access control system that secures the physical barrier.
   - 5.2. Upon actuation of a clearly identified manual release device with ready access that results in direct interruption of power to each secured physical barrier, after which such barriers remain in the open position for not less than 30 seconds. The manual release device shall be positioned at one of the following locations:
     - 5.2.1. On the egress side of each security access turnstile lane.
     - 5.2.2. At an *approved* location where it can be actuated by an employee assigned to the area at all times that the building is occupied.
   - 5.3. Upon actuation of the building *fire alarm system*, if provided, after which the physical barrier remains in the open position until the fire alarm system is manually reset.

     Exception: Actuation of a manual fire alarm box.
   - 5.4. Upon actuation of the building *automatic sprinkler* or *fire detection system*, after which the physical barrier remains in the open position until the *fire alarm system* is manually reset.

1010.3.3 High turnstile. Turnstiles more than 39 inches (991 mm) high shall meet the requirements for revolving doors or the requirements of Section 1010.3.2 for security access turnstiles.

1010.3.4 Additional door. Where serving an *occupant load* greater than 300, each turnstile that is not portable shall have a side-hinged swinging door that conforms to Section 1010.1 within 50 feet (15 240 mm).

Exception: A side-hinged swinging door is not required at security access turnstiles that comply with Section 1010.3.2.

SECTION 1011
STAIRWAYS

1011.1 General. *Stairways* serving occupied portions of a building shall comply with the requirements of Sections 1011.2 through 1011.13. *Alternating tread devices* shall comply with Section 1011.14. Ship's ladders shall comply with Section 1011.15. Ladders shall comply with Section 1011.16.

Exception: Within rooms or spaces used for assembly purposes, stepped aisles shall comply with Section 1029.

[S] 1011.2 Width and capacity. The required capacity of *stairways* shall be determined as specified in Section 1005.1, but the minimum width shall be not less than 44 inches (1118 mm). See Section 1009.3 for accessible *means of egress stairways*.

Exceptions:

1. *Stairways* serving an *occupant load* of less than 50 shall have a width of not less than 36 inches (914 mm).
2. *Spiral stairways* as provided for in Section 1011.10.
3. Where an incline platform lift or stairway chairlift is installed on *stairways* serving occupancies in Group R-3, or within *dwelling units* in occupancies in Group R-2, a clear passage width not less than 20 inches (508 mm) shall be provided. Where the seat and platform can be folded when not in use, the distance shall be measured from the folded position.
4. Stairways that are designed exclusively for circulation.

1011.3 Headroom. *Stairways* shall have a headroom clearance of not less than 80 inches (2032 mm) measured vertically from a line connecting the edge of the *nosings*. Such headroom shall be continuous above the *stairway* to the point where the line intersects the landing below, one tread depth beyond the bottom riser. The minimum clearance shall be maintained the full width of the *stairway* and landing.

Exceptions:

1. *Spiral stairways* complying with Section 1011.10 are permitted a 78-inch (1981 mm) headroom clearance.
2. In Group R-3 occupancies; within *dwelling units* in Group R-2 occupancies; and in Group U occupancies that are accessory to a Group R-3 occupancy or accessory to individual *dwelling units* in Group R-2 occupancies; where the *nosings* of treads at the side of a *flight* extend under the edge of a floor opening through which the *stair* passes, the floor opening shall be allowed to project horizontally into the required headroom not more than 4-3/4 inches (121 mm).

1011.4 Walkline. The walkline across *winder* treads shall be concentric to the direction of travel through the turn and located 12 inches (305 mm) from the side where the *winders* are narrower. The 12-inch (305 mm) dimension shall be measured from the widest point of the clear *stair* width at the walking surface of the *winder*. Where *winders* are adjacent within the *flight*, the point of the widest clear *stair* width of the adjacent *winders* shall be used.

[S] 1011.5 Stair treads and risers. *Stair* treads and risers shall comply with Sections 1011.5.1 through 1011.5.5.3.

1011.5.1 Dimension reference surfaces. For the purpose of this section, all dimensions are exclusive of carpets, rugs or runners.

1011.5.2 Riser height and tread depth. *Stair* riser heights shall be 7 inches (178 mm) maximum and 4 inches (102 mm) minimum. The riser height shall be measured vertically between the *nosings* of adjacent treads. Rectangular tread depths shall be 11 inches (279 mm) minimum measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's *nosing*. *Winder* treads shall have a minimum tread depth of 11 inches (279 mm) between the vertical planes of the foremost projection of adjacent treads at the intersections with the walkline and a minimum tread depth of 10 inches (254 mm) within the clear width of the *stair*.

Exceptions:

1. *Spiral stairways* in accordance with Section 1011.10.
2. *Stairways* connecting stepped *aisles* to cross *aisles* or concourses shall be permitted to use the riser/tread dimension in Section 1029.14.2.
3. In Group R-3 occupancies; within *dwelling units* in Group R-2 occupancies; and in Group U occupancies that are accessory to a Group R-3 occupancy or accessory to individual *dwelling units* in Group R-2 occupancies; the maximum riser height shall be 7-3/4 inches (197 mm); the minimum tread depth shall be 10 inches (254 mm); the minimum *winder* tread depth at the walkline shall be 10 inches (254 mm); and the minimum *winder* tread depth shall be 6 inches (152 mm). A *nosing* projection not less than 3/4 inch (19.1 mm) but not more than 1-1/4 inches (32 mm) shall be provided on *stairways* with solid risers where the tread depth is less than 11 inches (279 mm).
4. See ((~~Section 503.1 of~~)) the *International Existing Building Code* for the replacement of existing *stairways*.

5. In Group I-3 facilities, *stairways* providing access to guard towers, observation stations and control rooms, not more than 250 square feet (23 m^2) in area, shall be permitted to have a maximum riser height of 8 inches (203 mm) and a minimum tread depth of 9 inches (229 mm).

1011.5.3 Winder treads. *Winder* treads are not permitted in *means of egress stairways* except within a *dwelling unit*.

Exceptions:

1. Curved *stairways* in accordance with Section 1011.9.
2. *Spiral stairways* in accordance with Section 1011.10.

[S] 1011.5.4 Dimensional uniformity. *Stair* treads and risers shall be of uniform size and shape. The tolerance between the largest and smallest riser height or between the largest and smallest tread depth shall not exceed 3/8 inch (9.5 mm) in any *flight* of *stairs*. The greatest *winder* tread depth at the walkline within any *flight* of *stairs* shall not exceed the smallest by more than 3/8 inch (9.5 mm).

Exceptions:

1. *Stairways* connecting stepped *aisles* to cross *aisles* or concourses shall be permitted to comply with the dimensional nonuniformity in Section 1029.14.2.
2. Consistently shaped *winders*, complying with Section 1011.5, differing from rectangular treads in the same *flight* of *stairs*.
3. Nonuniform riser dimension complying with Section 1011.5.4.1.

1011.5.4.1 Nonuniform height risers. Where the bottom or top riser adjoins a sloping *public way*, walkway or driveway having an established grade and serving as a landing, the bottom or top riser is permitted to be reduced along the slope. ((~~to less than 4 inches (102 mm) in height, with the variation in height of the bottom or top riser not to exceed one unit vertical in 12 units horizontal (8 percent slope) of *stair* width. The *nosings* or leading edges of treads at such nonuniform height risers shall have a distinctive marking stripe, different from any other *nosing* marking provided on the *stair flight*. The distinctive marking stripe shall be visible in descent of the *stair* and shall have a slip-resistant surface. Marking stripes shall have a width of not less than 1 inch (25 mm) but not more than 2 inches (51 mm).~~))

1011.5.5 Nosing and riser profile. *Nosings* shall have a curvature or bevel of not less than 1/16 inch (1.6 mm) but not more than 9/16 inch (14.3 mm) from the foremost projection of the tread. Risers shall be solid and vertical or sloped under the tread above from the underside of the *nosing* above at an angle not more than 30 degrees (0.52 rad) from the vertical.

1011.5.5.1 Nosing projection size. The leading edge (*nosings*) of treads shall project not more than 1-1/4 inches (32 mm) beyond the tread below.

1011.5.5.2 Nosing projection uniformity. *Nosing* projections of the leading edges shall be of uniform size, including the projections of the *nosing's* leading edge of the floor at the top of a *flight*.

1011.5.5.3 Solid risers. Risers shall be solid.

Exceptions:

1. Solid risers are not required for *stairways* that are not required to comply with Section 1009.3, provided that the opening between treads does not permit the passage of a sphere with a diameter of 4 inches (102 mm).
2. Solid risers are not required for occupancies in Group I-3 or in Group F, H and S occupancies other than areas accessible to the public. The size of the opening in the riser is not restricted.
3. Solid risers are not required for *spiral stairways* constructed in accordance with Section 1011.10.

1011.6 Stairway landings. There shall be a floor or landing at the top and bottom of each *stairway*. The width of landings, measured perpendicularly to the direction of travel, shall be not less than the width of *stairways* served. Every landing shall have a minimum depth, measured parallel to the direction of travel, equal to the width of the *stairway* or 48 inches (1219 mm), whichever is less. Doors opening onto a landing shall not reduce the landing to less than one-half the required width. When fully open, the door shall not project more than 7 inches (178 mm) into a landing. Where *wheelchair spaces* are required on the *stairway* landing in accordance with Section 1009.6.3, the *wheelchair space* shall not be located in the required width of the landing and doors shall not swing over the *wheelchair spaces*.

Exception: Where *stairways* connect stepped *aisles* to cross *aisles* or concourses, *stairway* landings are not required at the transition between *stairways* and stepped *aisles* constructed in accordance with Section 1029.

[W] 1011.7 Stairway construction. *Stairways* shall be built of materials consistent with the types permitted for the type of construction of the building. ((~~, except that wood *handrails* shall be permitted for all types of construction.~~))

Exceptions:

1. Wood handrails shall be permitted in all types of construction.
2. Interior exit stairway in accordance with Section 510.2.

1011.7.1 Stairway walking surface. The walking surface of treads and landings of a *stairway* shall not be sloped steeper than one unit vertical in 48 units horizontal (2-percent slope) in any direction. *Stairway* treads and landings shall have a solid surface. Finish floor surfaces shall be securely attached.

Exceptions:

1. Openings in *stair* walking surfaces shall be a size that does not permit the passage of 1/2-inch-diameter (12.7 mm) sphere. Elongated openings shall be placed so that the long dimension is perpendicular to the direction of travel.
2. In Group F, H and S occupancies, other than areas of parking structures accessible to the public, openings in treads and landings shall not be prohibited provided that a sphere with a diameter of 1-1/8 inches (29 mm) cannot pass through the opening.

1011.7.2 Outdoor conditions. Outdoor *stairways* and outdoor approaches to *stairways* shall be designed so that water will not accumulate on walking surfaces.

1011.7.3 Enclosures under interior stairways. The walls and soffits within enclosed usable spaces under enclosed and unenclosed stairways shall be protected by 1-hour fire-resistance-rated construction or the fire-resistance rating of the stairway enclosure, whichever is greater. Access to the enclosed space shall not be directly from within the stairway enclosure.

Exception: Spaces under *stairways* serving and contained within a single residential dwelling unit in Group R-2 or R-3 shall be permitted to be protected on the enclosed side with 1/2-inch (12.7 mm) gypsum board.

1011.7.4 Enclosures under exterior stairways. There shall not be enclosed usable space under *exterior exit stairways* unless the space is completely enclosed in 1-hour fire-resistance-rated construction. The open space under *exterior stairways* shall not be used for any purpose.

[S] 1011.8 Vertical rise. A flight of stairs shall not have a vertical rise greater than 12 feet (3658 mm) between floor levels or landings.

Exceptions:

1. Spiral stairways used as a means of egress from technical production areas.
2. Stairways that are designed exclusively for circulation.

1011.9 Curved stairways. Curved stairways with winder treads shall have treads and risers in accordance with Section 1011.5 and the smallest radius shall be not less than twice the minimum width or required capacity of the stairway.

Exception: The radius restriction shall not apply to curved stairways in Group R-3 and within individual dwelling units in Group R-2.

[S] 1011.10 Spiral stairways. *Spiral stairways* are permitted to be used as a component in the *means of egress* only within *dwelling units* or from a space not more than 250 square feet (23 m^2) in area and serving not more than five occupants, ((~~or~~)) from *technical production areas* in accordance with Section 410.5 or as approved by the building official.

1. A *spiral stairway* shall have a 6-3/4-inch (171 mm) minimum clear tread depth at a point 12 inches (305 mm) from the narrow edge. The risers shall be sufficient to provide a headroom of 78 inches (1981 mm) minimum, but riser height shall not be more than 9-1/2 inches (241 mm). The minimum *stairway* clear width at and below the *handrail* shall be 26 inches (660 mm).
2. Spiral stairways are permitted to be used exclusively for circulation, provided:
   - 2.1. The spiral stairway connects any combination of the following: Group B occupancy, Group R occupancy, or Group A occupancies that are accessory to a Group R occupancy;
   - 2.2. It can be demonstrated that the occupants are unlikely to access the spiral stairway in an emergency;
   - 2.3. The required *means of egress* is clear and readily visible to occupants; and
   - 2.4. A placard is installed at the spiral stairway warning occupants that the spiral stairway is “NOT AN EXIT” in accordance with 1013.7.

1011.11 Handrails. *Flights of stairways* shall have *handrails* on each side and shall comply with Section 1014. Where glass is used to provide the *handrail*, the *handrail* shall comply with Section 2407.

Exceptions:

1. *Flights of stairways* within dwelling units and *flights of spiral stairways* are permitted to have a *handrail* on one side only.
2. Decks, patios and walkways that have a single change in elevation where the landing depth on each side of the change of elevation is greater than what is required for a landing do not require *handrails*.
3. In Group R-3 occupancies, a change in elevation consisting of a single riser at an entrance or egress door does not require *handrails*.

4. Changes in room elevations of three or fewer risers within dwelling units and sleeping units in Group R-2 and R-3 do not require *handrails*.

[S] 1011.12 Stairway to roof. In buildings four or more stories above *grade plane*, one *stairway* shall extend to the roof surface unless the roof has a slope steeper than four units vertical in 12 units horizontal (33-percent slope).

Exceptions:

1. Other than where required by Section 1011.12.1, in buildings without an occupied roof, access to the roof from the top story shall be permitted to be by an *alternating tread device* ((,)) or a ship's ladder. ((~~or a permanent ladder.~~))
2. Access to the roof is not required in Group R-3 occupancies.

1011.12.1 Stairway to elevator equipment. Roofs and penthouses containing elevator equipment that must be accessed for maintenance are required to be accessed by a stairway.

1011.12.2 Roof access. Where a stairway is provided to a roof, access to the roof shall be provided through a penthouse complying with Section 1510.2.

Exception: In buildings without an occupied roof, access to the roof shall be permitted to be a roof hatch or trap door not less than 16 square feet (1.5 m^2) in area and having a minimum dimension of 2 feet 6 inches (((~~610~~)) 762 mm).

1011.13 Guards. Guards shall be provided along stairways and landings where required by Section 1015 and shall be constructed in accordance with Section 1015. Where the roof hatch opening providing the required access is located within 10 feet (3049 mm) of the roof edge, such roof access or roof edge shall be protected by guards installed in accordance with Section 1015.

1011.14 Alternating tread devices. *Alternating tread devices* are limited to an element of a *means of egress* in buildings of Groups F, H and S from a mezzanine not more than 250 square feet (23 m^2) in area and that serves not more than five occupants; in buildings of Group I-3 from a guard tower, observation station or control room not more than 250 square feet (23 m^2) in area and for access to unoccupied roofs. *Alternating tread devices* used as a means of egress shall not have a rise greater than 20 feet (6096 mm) between floor levels or landings.

1011.14.1 Handrails of alternating tread devices. Handrails shall be provided on both sides of alternating tread devices and shall comply with Section 1014.

1011.14.2 Treads of alternating tread devices. *Alternating tread devices* shall have a minimum tread depth of 5 inches (127 mm), a minimum projected tread depth of 8-1/2 inches (216 mm), a minimum tread width of 7 inches (178 mm) and a maximum riser height of 9-1/2 inches (241 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projections of adjacent treads. The riser height shall be measured vertically between the leading edges of adjacent treads. The riser height and tread depth provided shall result in an angle of ascent from the horizontal of between 50 and 70 degrees (0.87 and 1.22 rad). The initial tread of the device shall begin at the same elevation as the platform, landing or floor surface.

Exception: *Alternating tread devices* used as an element of a *means of egress* in buildings from a mezzanine area not more than 250 square feet (23 m^2) in area that serves not more than five occupants shall have a minimum tread depth of 3 inches (76 mm) with a minimum projected tread depth of 10-1/2 inches (267 mm). The rise to the next alternating tread surface shall not exceed 8 inches (203 mm).

1011.15 Ship's ladders. Ship's ladders are permitted to be used in Group I-3 as a component of a *means of egress* to and from control rooms or elevated facility observation stations not more than 250 square feet (23 m^2) with not more than three occupants and for access to unoccupied roofs. The minimum clear width at and below the *handrails* shall be 20 inches (508 mm).

1011.15.1 Handrails of ship's ladders. *Handrails* shall be provided on both sides of ship's ladders.

1011.15.2 Treads of ship's ladders. Ship's ladders shall have a minimum tread depth of 5 inches (127 mm). The tread shall be projected such that the total of the tread depth plus the *nosing* projection is not less than 8-1/2 inches (216 mm). The maximum riser height shall be 9-1/2 inches (241 mm).

1011.16 Ladders. Permanent ladders shall not serve as a part of the *means of egress* from occupied spaces within a building. Permanent ladders shall be constructed in accordance with Section 306.5 of the *International Mechanical Code*. Permanent ladders shall be permitted to provide access to the following areas:

1. Spaces frequented only by personnel for maintenance, repair or monitoring of equipment.
2. Nonoccupiable spaces accessed only by catwalks, crawl spaces, freight elevators or very narrow passageways.
3. Raised areas used primarily for purposes of security, life safety or fire safety including, but not limited to, observation galleries, prison guard towers, fire towers or lifeguard stands.
4. Elevated levels in Group U not open to the general public.
5. Nonoccupied roofs that are not required to have *stairway* access in accordance with Section 1011.12.1.

6. Where permitted to access equipment and appliances in accordance with Section 306.5 of the *International Mechanical Code*.

[W] 1011.17 Stairways in individual dwelling units. Stairs or ladders within individual *dwelling units* used for access to areas of 200 square feet (18.6 m^2) or less which do not contain the primary bathroom or kitchen are exempt from the requirements of Section 1011.

SECTION 1012
RAMPS

[W] 1012.1 Scope. The provisions of this section shall apply to ramps used as a component of a *means of egress.*

Exceptions:

1. Ramped *aisles* within assembly rooms or spaces shall comply with the provisions in Section 1029.
2. Curb ramps shall comply with ICC A117.1.
3. Vehicle ramps in parking garages for pedestrian *exit access* shall not be required to comply with Sections 1012.3 through 1012.10 where they are not an *accessible route* serving *accessible* parking spaces, other required *accessible* elements or part of an accessible *means of egress*.
4. In a parking garage where one accessible *means of egress* serving accessible parking spaces or other accessible elements is provided, a second accessible *means of egress* serving that area shall be permitted to include a vehicle ramp that does not comply with Sections 1012.4, 1012.5 and 1012.8. A landing complying with Sections 1012.6.1 and 1012.6.4 shall be provided at any change of direction in the accessible *means of egress*.

1012.2 Slope. *Ramps* used as part of a *means of egress* shall have a running slope not steeper than one unit vertical in 12 units horizontal (8-percent slope). The slope of other pedestrian *ramps* shall not be steeper than one unit vertical in eight units horizontal (12.5-percent slope).

1012.3 Cross slope. The slope measured perpendicular to the direction of travel of a *ramp* shall not be steeper than one unit vertical in 48 units horizontal (2-percent slope).

1012.4 Vertical rise. The rise for any *ramp* run shall be 30 inches (762 mm) maximum.

1012.5 Minimum dimensions. The minimum dimensions of *means of egress ramps* shall comply with Sections 1012.5.1 through 1012.5.3.

1012.5.1 Width and capacity. The minimum width and required capacity of a *means of egress ramp* shall be not less than that required for *corridors* by Section 1020.2. The clear width of a *ramp* between *handrails*, if provided, or other permissible projections shall be 36 inches (914 mm) minimum.

1012.5.2 Headroom. The minimum headroom in all parts of the *means of egress ramp* shall be not less than 80 inches (2032 mm) above the finished floor of the ramp run and any intermediate landings. The minimum clearance shall be maintained for the full width of the *ramp* and landing.

1012.5.3 Restrictions. *Means of egress ramps* shall not reduce in width in the direction of egress travel. Projections into the required *ramp* and landing width are prohibited. Doors opening onto a landing shall not reduce the clear width to less than 42 inches (1067 mm).

1012.6 Landings. *Ramps* shall have landings at the bottom and top of each *ramp*, points of turning, entrance, exits and at doors. Landings shall comply with Sections 1012.6.1 through 1012.6.5.

1012.6.1 Slope. Landings shall have a slope not steeper than one unit vertical in 48 units horizontal (2-percent slope) in any direction. Changes in level are not permitted.

1012.6.2 Width. The landing width shall be not less than the width of the widest *ramp* run adjoining the landing.

1012.6.3 Length. The landing length shall be 60 inches (1525 mm) minimum.

Exceptions:

1. In Group R-2 and R-3 individual *dwelling* and *sleeping units* that are not required to be *Accessible units*, *Type A units* or *Type B units* in accordance with Section 1107, landings are permitted to be 36 inches (914 mm) minimum.
2. Where the *ramp* is not a part of an *accessible route*, the length of the landing shall not be required to be more than 48 inches (1220 mm) in the direction of travel.

1012.6.4 Change in direction. Where changes in direction of travel occur at landings provided between *ramp* runs, the landing shall be 60 inches by 60 inches (1524 mm by 1524 mm) minimum.

Exception: In Group R-2 and R-3 individual *dwelling* or *sleeping units* that are not required to be *Accessible units*, *Type A units* or *Type B units* in accordance with Section 1107, landings are permitted to be 36 inches by 36 inches (914 mm by 914 mm) minimum.

1012.6.5 Doorways. Where doorways are located adjacent to a *ramp* landing, maneuvering clearances required by *ICC A117.1* are permitted to overlap the required landing area.

1012.7 Ramp construction. *Ramps* shall be built of materials consistent with the types permitted for the type of construction of the building, except that wood *handrails* shall be permitted for all types of construction.

1012.7.1 Ramp surface. The surface of *ramps* shall be of slip-resistant materials that are securely attached.

1012.7.2 Outdoor conditions. Outdoor *ramps* and outdoor approaches to *ramps* shall be designed so that water will not accumulate on walking surfaces.

1012.8 Handrails. *Ramps* with a rise greater than 6 inches (152 mm) shall have *handrails* on both sides. *Handrails* shall comply with Section 1014.

1012.9 Guards. *Guards* shall be provided where required by Section 1015 and shall be constructed in accordance with Section 1015.

1012.10 Edge protection. Edge protection complying with Section 1012.10.1 or 1012.10.2 shall be provided on each side of *ramp* runs and at each side of *ramp* landings.

Exceptions:

1. Edge protection is not required on *ramps* that are not required to have *handrails*, provided they have flared sides that comply with the *ICC A117.1* curb ramp provisions.
2. Edge protection is not required on the sides of *ramp* landings serving an adjoining *ramp* run or *stairway*.
3. Edge protection is not required on the sides of *ramp* landings having a vertical dropoff of not more than 1/2 inch (12.7 mm) within 10 inches (254 mm) horizontally of the required landing area.

1012.10.1 Curb, rail, wall or barrier. A curb, rail, wall or barrier shall be provided to serve as edge protection. A curb shall be not less than 4 inches (102 mm) in height. Barriers shall be constructed so that the barrier prevents the passage of a 4-inch-diameter (102 mm) sphere, where any portion of the sphere is within 4 inches (102 mm) of the floor or ground surface.

1012.10.2 Extended floor or ground surface. The floor or ground surface of the *ramp* run or landing shall extend 12 inches (305 mm) minimum beyond the inside face of a *handrail* complying with Section 1014.

SECTION 1013
EXIT SIGNS

[S] 1013.1 Where required. *Exits* and *exit access* doors shall be marked by an *approved* exit sign readily visible from any direction of egress travel. The path of egress travel to *exits* and within *exits* shall be marked by readily visible exit signs to clearly indicate the direction of egress travel in cases where the *exit* or the path of egress travel is not immediately visible to the occupants. Intervening *means of egress* doors within *exits* shall be marked by exit signs. Exit sign placement shall be such that any point in an *exit access corridor* or *exit passageway* is within 100 feet (30 480 mm) or the *listed* viewing distance of the sign, whichever is less, from the nearest visible exit sign. Exit signs shall be located at any other location determined by the *building official* to be necessary to clearly indicate the direction of egress.

Exceptions:

1. Exit signs are not required in rooms or areas that require only one *exit* or *exit access* other than in buildings designed with a single exit stairway according to Section 1006.3.3 item 7.
2. Main exterior *exit* doors or gates that are obviously and clearly identifiable as *exits* need not have exit signs where *approved* by the *building official*.
3. Exit signs are not required in occupancies in Group U and individual *sleeping units* or *dwelling units* in Group R-1, R-2 or R-3.
4. Exit signs are not required in dayrooms, sleeping rooms or dormitories in occupancies in Group I-3.
5. In occupancies in Groups A-4 and A-5, exit signs are not required on the seating side of vomitories or openings into seating areas where exit signs are provided in the concourse that are readily apparent from the vomitories. Egress lighting is provided to identify each vomitory or opening within the seating area in an emergency.
6. Exit signs are not required on exterior stairways serving exterior exit balconies.

1013.2 Low-level exit signs in Group R-1. Where exit signs are required in Group R-1 occupancies by Section 1013.1, additional low-level exit signs shall be provided in all areas serving guest rooms in Group R-1 occupancies and shall comply with Section 1013.5.

The bottom of the sign shall be not less than 10 inches (254 mm) nor more than 18 inches (455 mm) above the floor level. The sign shall be flush mounted to the door or wall. Where mounted on the wall, the edge of the sign shall be within 4 inches (102 mm) of the door frame on the latch side.

1013.3 Illumination. Exit signs shall be internally or externally illuminated.

Exception: Tactile signs required by Section 1013.4 need not be provided with illumination.

1013.4 Raised character and braille exit signs. A sign stating EXIT in visual characters, raised characters and braille and complying with *ICC A117.1* shall be provided adjacent to each door to an *area of refuge*, providing direct access to a stairway, an exterior area for assisted rescue, an *exit stairway* or *ramp*, an *exit passageway* and the *exit discharge*.

1013.5 Internally illuminated exit signs. Electrically powered, *self-luminous* and *photoluminescent* exit signs shall be *listed* and *labeled* in accordance with UL 924 and shall be installed in accordance with the manufacturer's instructions and Chapter 27. Exit signs shall be illuminated at all times.

[S] 1013.6 Externally illuminated exit signs. Externally illuminated exit signs shall comply with Sections 1013.6.1 through 1013.6.3.

1013.6.1 Graphics. Every exit sign and directional exit sign shall have plainly legible letters not less than 6 inches (152 mm) high with the principal strokes of the letters not less than 3/4 inch (19.1 mm) wide. The word "EXIT" shall have letters having a width not less than 2 inches (51 mm) wide, except the letter "I," and the minimum spacing between letters shall be not less than 3/8 inch (9.5 mm). Signs larger than the minimum established in this section shall have letter widths, strokes and spacing in proportion to their height.

The word "EXIT" shall be in high contrast with the background and shall be clearly discernible when the means of exit sign illumination is or is not energized. If a chevron directional indicator is provided as part of the exit sign, the construction shall be such that the direction of the chevron directional indicator cannot be readily changed.

Exception: Existing exit signs with letters at least 5 inches (127 mm) in height are permitted to be reused.

1013.6.2 Exit sign illumination. The face of an exit sign illuminated from an external source shall have an intensity of not less than 5 footcandles (54 lux).

1013.6.3 Power source. Exit signs shall be illuminated at all times. To ensure continued illumination for a duration of not less than 90 minutes in case of primary power loss, the sign illumination means shall be connected to an emergency power system provided from storage batteries, unit equipment or an on-site generator. The installation of the emergency power system shall be in accordance with Chapter 27. Group I-2, Condition 2 exit sign illumination shall not be provided by unit equipment batteries only.

Exception: *Approved* exit sign illumination types that provide continuous illumination independent of external power sources for a duration of not less than 90 minutes, in case of primary power loss, are not required to be connected to an emergency electrical system.

[S] 1013.7 Not-an-exit warnings. Placards reading "NOT AN EXIT" shall be installed at all doorways, passageways or stairways which are not exits, exit accesses or exit discharges, and which may be mistaken for an exit. A sign indicating the use of the doorway, passageway or stairway, such as "TO BASEMENT," "STORE ROOM," "LINEN CLOSET," is permitted in lieu of the "NOT AN EXIT" sign.

SECTION 1014
HANDRAILS

1014.1 Where required. *Handrails* serving *flights of stairways*, *ramps*, stepped *aisles* and ramped *aisles* shall be adequate in strength and attachment in accordance with Section 1607.8. *Handrails* required for *flights of stairways* by Section 1011.11 shall comply with Sections 1014.2 through 1014.9. *Handrails* required for *ramps* by Section 1012.8 shall comply with Sections 1014.2 through 1014.8. *Handrails* for stepped *aisles* and ramped *aisles* required by Section 1029.16 shall comply with Sections 1014.2 through 1014.8.

1014.2 Height. *Handrail* height, measured above *stair* tread *nosings*, or finish surface of *ramp* slope, shall be uniform, not less than 34 inches (864 mm) and not more than 38 inches (965 mm). *Handrail* height of *alternating tread devices* and ship's ladders, measured above tread *nosings*, shall be uniform, not less than 30 inches (762 mm) and not more than 34 inches (864 mm).

Exceptions:

1. Where handrail fittings or bendings are used to provide continuous transition between *flights*, the fittings or bendings shall be permitted to exceed the maximum height.

6. In Group F occupancies where *exit access stairways* serve fewer than three stories and such *stairways* are not open to the public, and where the top of the *guard* also serves as a *handrail*, the top of the *guard* shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm) measured vertically from a line connecting the leading edges of the treads.

1015.4 Opening limitations. Required *guards* shall not have openings that allow passage of a sphere 4 inches (102 mm) in diameter from the walking surface to the required *guard* height.

Exceptions:

1. From a height of 36 inches (914 mm) to 42 inches (1067 mm), *guards* shall not have openings that allow passage of a sphere 4-3/8 inches (111 mm) in diameter.
2. The triangular openings at the open sides of a *stair*, formed by the riser, tread and bottom rail shall not allow passage of a sphere 6 inches (152 mm) in diameter.
3. At elevated walking surfaces for access to and use of electrical, mechanical or plumbing systems or equipment, *guards* shall not have openings that allow passage of a sphere 21 inches (533 mm) in diameter.
4. In areas that are not open to the public within occupancies in Group I-3, F, H or S, and for *alternating tread devices* and ship's ladders, *guards* shall not have openings that allow passage of a sphere 21 inches (533 mm) in diameter.
5. In assembly seating areas, *guards* required at the end of aisles in accordance with Section 1029.17.4 shall not have openings that allow passage of a sphere 4 inches (102 mm) in diameter up to a height of 26 inches (660 mm). From a height of 26 inches (660 mm) to 42 inches (1067 mm) above the adjacent walking surfaces, *guards* shall not have openings that allow passage of a sphere 8 inches (203 mm) in diameter.
6. Within individual *dwelling units* and *sleeping units* in Group R-2 and R-3 occupancies, *guards* on the open sides of *stairs* shall not have openings that allow passage of a sphere 4-3/8 (111 mm) inches in diameter.

1015.5 Screen porches. Porches and decks that are enclosed with insect screening shall be provided with *guards* where the walking surface is located more than 30 inches (762 mm) above the floor or grade below.

[S] 1015.6 ((~~Mechanical equipment~~)) Equipment, systems and devices. *Guards* shall be provided where various components that require service are located within 10 feet (3048 mm) of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches (762 mm) above the floor, roof or grade below. The *guard* shall extend not less than 30 inches (762 mm) beyond each end of such components. The *guard* shall be constructed so as to prevent the passage of a sphere 21 inches (533 mm) in diameter.

Exception: *Guards* are not required where personal fall arrest anchorage connector devices that comply with ANSI/ASSE Z 359.1 are installed.

[S] 1015.7 Roof access. *Guards* shall be provided where the roof hatch opening is located within 10 feet (3048 mm) of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches (762 mm) above the floor, roof or grade below. The *guard* shall be constructed so as to prevent the passage of a sphere 21 inches (533 mm) in diameter.

((~~**Exception:** *Guards* are not required where personal fall arrest anchorage connector devices that comply with ANSI/ASSE Z 359.1 are installed.~~))

1015.8 Window openings. Windows in Group R-2 and R-3 buildings including *dwelling units*, where the top of the sill of an operable window opening is located less than 36 inches above the finished floor and more than 72 inches (1829 mm) above the finished grade or other surface below on the exterior of the building, shall comply with one of the following:

1. Operable windows where the top of the sill of the opening is located more than 75 feet (22 860 mm) above the finished grade or other surface below and that are provided with window fall prevention devices that comply with ASTM F2006.
2. Operable windows where the openings will not allow a 4-inch-diameter (102 mm) sphere to pass through the opening when the window is in its largest opened position.
3. Operable windows where the openings are provided with window fall prevention devices that comply with ASTM F2090.
4. Operable windows that are provided with window opening control devices that comply with Section 1015.8.1.

1015.8.1 Window opening control devices. Window opening control devices shall comply with ASTM F2090. The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by Section 1030.2.

SECTION 1016
EXIT ACCESS

1016.1 General. The *exit access* shall comply with the applicable provisions of Sections 1003 through 1015. *Exit access* arrangement shall comply with Sections 1016 through 1021.

[S] 1016.2 Egress through intervening spaces. Egress through intervening spaces shall comply with this section.

1. *Exit access* through an enclosed elevator lobby is permitted. Access to not less than one of the required *exits* shall be provided without travel through the enclosed elevator lobbies required by Section ((~~3006~~)) 713.14. Where the path of exit access travel passes through an enclosed elevator lobby, the level of protection required for the enclosed elevator lobby is not required to be extended to the *exit* unless direct access to an *exit* is required by other sections of this code.
2. Egress from a room or space shall not pass through adjoining or intervening rooms or areas, except where such adjoining rooms or areas and the area served are accessory to one or the other, are not a Group H occupancy and provide a discernible path of egress travel to an *exit*.

   Exception: *Means of egress* are not prohibited through adjoining or intervening rooms or spaces in a Group H, S or F occupancy where the adjoining or intervening rooms or spaces are the same or a lesser hazard occupancy group.
3. An *exit access* shall not pass through a room that can be locked to prevent egress.
4. *Means of egress* from *dwelling units* or sleeping areas shall not lead through other sleeping areas, toilet rooms or bathrooms.
5. Egress shall not pass through kitchens, storage rooms, closets or spaces used for similar purposes.

   Exceptions:

   1. *Means of egress* are not prohibited through a kitchen area serving adjoining rooms constituting part of the same *dwelling unit* or *sleeping unit*.
   2. *Means of egress* are not prohibited through stockrooms in Group M occupancies where all of the following are met:

      2.1. The stock is of the same hazard classification as that found in the main retail area.

      2.2. Not more than 50 percent of the *exit access* is through the stockroom.

      2.3. The stockroom is not subject to locking from the egress side.

      2.4. There is a demarcated, minimum 44-inch-wide (1118 mm) *aisle* defined by full- or partial-height fixed walls or similar construction that will maintain the required width and lead directly from the retail area to the *exit* without obstructions.
6. Unless *approved* by the *building official*, where two or more exits are required, exit travel shall not pass through an interior exit stairway as the only way to reach another exit.

Note: See Section 1010.1.9.4 for conditions in which exit access doors from elevator lobbies are permitted to be locked.

1016.2.1 Multiple tenants. Where more than one tenant occupies any one floor of a building or structure, each tenant space, *dwelling unit* and *sleeping unit* shall be provided with access to the required *exits* without passing through adjacent tenant spaces, *dwelling units* and *sleeping units*.

Exception: The *means of egress* from a smaller tenant space shall not be prohibited from passing through a larger adjoining tenant space where such rooms or spaces of the smaller tenant occupy less than 10 percent of the area of the larger tenant space through which they pass; are the same or similar occupancy group; a discernible path of egress travel to an *exit* is provided; and the *means of egress* into the adjoining space is not subject to locking from the egress side. A required *means of egress* serving the larger tenant space shall not pass through the smaller tenant space or spaces.

SECTION 1017
EXIT ACCESS TRAVEL DISTANCE

1017.1 General. Travel distance within the *exit access* portion of the *means of egress* system shall be in accordance with this section.

Note: Additional interior exit stairways or corridors constructed as smoke barriers may be required for standpipe hose connections. See Section 905.4.

1017.2 Limitations. *Exit access* travel distance shall not exceed the values given in Table 1017.2.

[S] TABLE 1017.2
EXIT ACCESS TRAVEL DISTANCE[a]

OCCUPANCY	WITHOUT SPRINKLER SYSTEM (feet)	WITH SPRINKLER SYSTEM (feet)
A, E, F-1, M, R, S-1	200[e]	250[b]
I-1	Not Permitted	250[b]
B	200	300[c]
F-2, S-2, U	300	400[c]
H-1	Not Permitted	75[d]
H-2	Not Permitted	100[d]
H-3	Not Permitted	150[d]
H-4	Not Permitted	175[d]
H-5	Not Permitted	200[c]
I-2, I-3	Not Permitted	200[c]
I-4	150	200[c]

For SI: 1 foot = 304.8 mm.

a. See the following sections for modifications to exit access travel distance requirements:
Section 402.8: For the distance limitation in malls.
Section 404.9: For the distance limitation through an atrium space.
Section 407.4: For the distance limitation in Group I-2.
Sections 408.6.1 and 408.8.1: For the distance limitations in Group I-3.
Section 411.3: For the distance limitation in special amusement buildings.
Section 412.6: For the distance limitations in aircraft manufacturing facilities.
Section 1006.2.2.2: For the distance limitation in refrigeration machinery rooms.
Section 1006.2.2.3: For the distance limitation in refrigerated rooms and spaces.
Section 1006.3.3: For buildings with one exit.
Section 1017.2.2: For increased distance limitation in Groups F-1 and S-1.
Section 1029.7: For increased limitation in assembly seating.
((~~Section 3103.4: For temporary structures.~~))
Section 3104.9: For pedestrian walkways.

b. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2. See Section 903 for occupancies where automatic sprinkler systems are permitted in accordance with Section 903.3.1.2.

c. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

d. Group H occupancies equipped throughout with an automatic sprinkler system in accordance with Section 903.2.5.1.

e. Group R-3 and R-4 buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.3. See Section 903.2.8 for occupancies where automatic sprinkler systems are permitted in accordance with Section 903.3.1.3.

1017.2.1 Exterior egress balcony increase. *Exit access* travel distances specified in Table 1017.2 shall be increased up to an additional 100 feet (30 480 mm) provided that the last portion of the *exit access* leading to the *exit* occurs on an exterior egress balcony constructed in accordance with Section 1021. The length of such balcony shall be not less than the amount of the increase taken.

1017.2.2 Groups F-1 and S-1 increase. The maximum *exit access* travel distance shall be 400 feet (122 m) in Group F-1 or S-1 occupancies where all of the following conditions are met:

1. The portion of the building classified as Group F-1 or S-1 is limited to one story in height.
2. The minimum height from the finished floor to the bottom of the ceiling or roof slab or deck is 24 feet (7315 mm).
3. The building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

1017.3 Measurement. *Exit access* travel distance shall be measured from the most remote point of each room, area or space along the natural and unobstructed path of horizontal and vertical egress travel to the entrance to an *exit*.

Exception: In *open parking garages*, *exit access* travel distance is permitted to be measured to the closest riser of an *exit access stairway* or the closest slope of an *exit access ramp*.

1017.3.1 Exit access stairways and ramps. Travel distance on *exit access stairways* or *ramps* shall be included in the *exit access* travel distance measurement. The measurement along *stairways* shall be made on a plane parallel and tangent to the *stair* tread *nosings* in the center of the *stair* and landings. The measurement along *ramps* shall be made on the walking surface in the center of the *ramp* and landings.

SECTION 1018
AISLES

1018.1 General. *Aisles* and *aisle accessways* serving as a portion of the *exit access* in the *means of egress* system shall comply with the requirements of this section. *Aisles* or *aisle accessways* shall be provided from all occupied portions of the *exit access* that contain seats, tables, furnishings, displays and similar fixtures or equipment. The minimum width or required capacity of *aisles* shall be unobstructed.

Exception: Encroachments complying with Section 1005.7.

1018.2 Aisles in assembly spaces. *Aisles and aisle accessways* serving a room or space used for assembly purposes shall comply with Section 1029.

1018.3 Aisles in Groups B and M. In Group B and M occupancies, the minimum clear aisle width shall be determined by Section 1005.1 for the *occupant load* served, but shall be not less than that required for corridors by Section 1020.2.

Exception: Nonpublic *aisles* serving less than 50 people and not required to be *accessible* by Chapter 11 need not exceed 28 inches (711 mm) in width.

1018.4 Aisle accessways in Group M. An *aisle accessway* shall be provided on not less than one side of each element within the *merchandise pad*. The minimum clear width for an *aisle accessway* not required to be *accessible* shall be 30 inches (762 mm). The required clear width of the *aisle accessway* shall be measured perpendicular to the elements and merchandise within the *merchandise pad*. The 30-inch (762 mm) minimum clear width shall be maintained to provide a path to an adjacent *aisle* or *aisle accessway*. The *common path of egress travel* shall not exceed 30 feet (9144 mm) from any point in the *merchandise pad*.

Exception: For areas serving not more than 50 occupants, the *common path of egress travel* shall not exceed 75 feet (22 860 mm).

1018.5 Aisles in other than assembly spaces and Groups B and M. In other than rooms or spaces used for assembly purposes and Group B and M occupancies, the minimum clear *aisle* capacity shall be determined by Section 1005.1 for the occupant load served, but the width shall be not less than that required for corridors by Section 1020.2.

Exception: Nonpublic *aisles* serving less than 50 people and not required to be *accessible* by Chapter 11 need not exceed 28 inches (711 mm) in width.

SECTION 1019
EXIT ACCESS STAIRWAYS AND RAMPS

1019.1 General. *Exit access stairways* and *ramps* serving as an *exit access* component in a *means of egress* system shall comply with the requirements of this section. The number of stories connected by *exit access stairways* and *ramps* shall include *basements*, but not *mezzanines*.

1019.2 All occupancies. *Exit access stairways* and *ramps* that serve floor levels within a single story are not required to be enclosed.

[W][S] 1019.3 Occupancies other than Groups I-2 and I-3. In other than Group I-2 and I-3 occupancies, floor openings containing *exit access stairways* or *ramps* ((~~that do not comply with one of the conditions listed in this section~~)) shall be enclosed with a shaft enclosure constructed in accordance with Section 713.

Exceptions:

1. *Exit access stairways* and *ramps* that serve or atmospherically communicate between only two stories. Such interconnected stories shall not be open to other stories.
2. In Group R-1, R-2 or R-3 occupancies, *exit access stairways* and *ramps* connecting four stories or less serving and contained within an individual *dwelling unit* or *sleeping unit* or *live/work unit.*
3. *Exit access stairways* serving and contained within a Group R-3 congregate residence ((~~or a Group R-4 facility~~)) are not required to be enclosed.
4. *Exit access stairways* and *ramps* that are designed exclusively for circulation in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, where the area of the vertical opening between stories does not exceed twice the horizontal projected area of the *stairway* or *ramp* and the opening is protected by a draft curtain and closely spaced sprinklers in accordance with NFPA 13. In other than Group B and M occupancies, this provision is limited to openings that do not connect more than four stories.
5. *Exit access stairways* and *ramps* within an *atrium* complying with the provisions of Section 404.
6. *Exit access stairways* and *ramps* in *open parking garages* that serve only the parking garage.
7. *Exit access stairways* and *ramps* serving *smoke-protected* or *open-air assembly seating* complying with the *exit access* travel distance requirements of Section 1029.7.

8. *Exit access stairways* and *ramps* between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, *places of religious worship*, auditoriums and sports facilities.

1019.4 Group I-2 and I-3 occupancies. In Group I-2 and I-3 occupancies, floor openings between stories containing *exit access stairways* or *ramps* are required to be enclosed with a shaft enclosure constructed in accordance with Section 713.

Exception: In Group I-3 occupancies, *exit access stairways* or *ramps* constructed in accordance with Section 408 are not required to be enclosed.

SECTION 1020
CORRIDORS

[S] 1020.1 Construction. *Corridors* shall be fire-resistance rated in accordance with Table 1020.1. The *corridor* walls required to be fire-resistance rated shall comply with Section 708 for *fire partitions*.

Exceptions:

1. A *fire-resistance rating* is not required for *corridors* in an occupancy in Group E where each room that is used for instruction has not less than one door opening directly to the exterior and rooms for assembly purposes have not less than one-half of the required *means of egress* doors opening directly to the exterior. Exterior doors specified in this exception are required to be at ground level.
2. A *fire-resistance rating* is not required for *corridors* contained within a *dwelling unit* or *sleeping unit* in an occupancy in Groups I-1 and R.
3. A *fire-resistance rating* is not required for *corridors* in *open parking garages*.
4. A *fire-resistance rating* is not required for *corridors* in an occupancy in Group B that is a space requiring only a single *means of egress* complying with Section 1006.2.
5. *Corridors* adjacent to the *exterior walls* of buildings shall be permitted to have unprotected openings on unrated *exterior walls* where unrated walls are permitted by Table 602 and unprotected openings are permitted by Table 705.8.
6. In office areas located in buildings of Types IA or IB construction, corridor walls need not be of fire-resistance-rated construction where the corridor side of the corridor walls is finished with materials having a maximum Class B rating as defined in Chapter 8. This exception does not apply to outpatient clinics and medical offices.
7. The occupant load of Group B conference rooms, lunch rooms without grease-producing cooking and other assembly rooms with an occupant load of less than 50 in each room need not be considered when determining whether corridor construction is required, provided such rooms are accessory to an office tenant located in a building of Type IA or IB construction. This provision is permitted to be used in other construction types when the floor on which the assembly room is located is equipped with an *automatic sprinkler system.*

[S] 1020.1.1 Hoistway opening protection. Elevator hoistway openings shall be protected in accordance with Section ((~~3006.2.1~~)) 713.14.2.1.

TABLE 1020.1
CORRIDOR FIRE-RESISTANCE RATING

OCCUPANCY	OCCUPANT LOAD SERVED BY CORRIDOR	REQUIRED FIRE-RESISTANCE RATING (hours)	
		Without sprinkler system	With sprinkler system
H-1, H-2, H-3	All	Not Permitted	1[c]
H-4, H-5	Greater than 30	Not Permitted	1[c]
A, B, E, F, M, S, U	Greater than 30	1	0
R	((~~Greater than 10~~)) All	Not Permitted	((~~0.5[c]~~)) 1[d]
I-2[a]	All	Not Permitted	0
I-1, I-3	All	Not Permitted	1[b, c]
I-4	All	1	0

a. For requirements for occupancies in Group I-2, see Sections 407.2 and 407.3.
b. For a reduction in the fire-resistance rating for occupancies in Group I-3, see Section 408.8.
c. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 where allowed.
d. Group R-3 and R-4 buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.3. See Section 903.2.8 for occupancies where automatic sprinkler systems are permitted in accordance with Section 903.3.1.3.

1020.2 Width and capacity. The required capacity of *corridors* shall be determined as specified in Section 1005.1, but the minimum width shall be not less than that specified in Table 1020.2.

Exception: In Group I-2 occupancies, *corridors* are not required to have a clear width of 96 inches (2438 mm) in areas where there will not be stretcher or bed movement for access to care or as part of the defend-in-place strategy.

TABLE 1020.2
MINIMUM CORRIDOR WIDTH

OCCUPANCY	MINIMUM WIDTH (inches)
Any facility not listed in this table	44
Access to and utilization of mechanical, plumbing or electrical systems or equipment	24
With an occupant load of less than 50	36
Within a *dwelling unit*	36
In Group E with a *corridor* having an occupant load of 100 or more	72
In *corridors* and areas serving stretcher traffic in *ambulatory care facilities*	72
Group I-2 in areas where required for bed movement	96

For SI: 1 inch = 25.4 mm.

1020.3 Obstruction. The minimum width or required capacity of *corridors* shall be unobstructed.

Exception: Encroachments complying with Section 1005.7.

[W][S] 1020.4 Dead ends. Where more than one *exit* or *exit access doorway* is required, the *exit access* shall be arranged such that dead-end *corridors* do not exceed ((~~20 feet (6096 mm)~~)) 25 feet (7620 mm) in length.

Exceptions:

1. In ((~~in~~)) Group I-3, Condition 2, 3 or 4, occupancies, the dead end in a *corridor* shall not exceed 50 feet (15 240 mm).
2. In occupancies in Groups B, E, F, I-1, M, R-1, R-2, S and U, where the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, the length of the dead-end *corridors* shall not exceed 50 feet (15 240 mm).
3. A dead-end *corridor* shall not be limited in length where the length of the dead-end *corridor* is less than 2.5 times the least width of the dead-end *corridor*.
4. In Group I-2 occupancies, the length of dead-end *corridors* that do not serve patient rooms or patient treatment spaces shall not exceed 30 feet (9144 mm).
5. Dead ends are permitted to be 75 feet (22 860 mm) in length in areas containing Group B offices in buildings of Types IA and IB construction, where the cumulative occupant load does not exceed 50 for all areas for which the dead end serves as the only means of egress.

[S] 1020.5 Air movement in corridors. *Corridors* shall not serve as supply, return, exhaust, relief or ventilation air ducts or plenums except as allowed by Mechanical Code Section 601.2.

((~~Exceptions:~~

1. ~~Use of a *corridor* as a source of makeup air for exhaust systems in rooms that open directly onto such *corridors*, including toilet rooms, bathrooms, dressing rooms, smoking lounges and janitor closets, shall be permitted, provided that each such *corridor* is directly supplied with outdoor air at a rate greater than the rate of makeup air taken from the *corridor*.~~
2. ~~Where located within a *dwelling unit*, the use of *corridors* for conveying return air shall not be prohibited.~~
3. ~~Where located within tenant spaces of 1,000 square feet (93 m^2) or less in area, utilization of *corridors* for conveying return air is permitted.~~
4. ~~Incidental air movement from pressurized rooms within health care facilities, provided that the *corridor* is not the primary source of supply or return to the room.~~))

1020.5.1 Corridor ceiling. Use of the space between the *corridor* ceiling and the floor or roof structure above as a return air plenum is permitted for one or more of the following conditions:

1. The *corridor* is not required to be of *fire-resistance- rated* construction.
2. The *corridor* is separated from the plenum by *fire-resistance-rated* construction.
3. The air-handling system serving the *corridor* is shut down upon activation of the air-handling unit *smoke detectors* required by the *International Mechanical Code.*
4. The air-handling system serving the *corridor* is shut down upon detection of sprinkler water flow where the building is equipped throughout with an *automatic sprinkler system.*

5. The space between the *corridor* ceiling and the floor or roof structure above the *corridor* is used as a component of an approved engineered smoke control system.

1020.6 Corridor continuity. *Fire-resistance-rated corridors* shall be continuous from the point of entry to an *exit*, and shall not be interrupted by intervening rooms. Where the path of egress travel within a *fire-resistance-rated corridor* to the exit includes travel along unenclosed *exit access stairways* or *ramps*, the *fire-resistance rating* shall be continuous for the length of the *stairway* or *ramp* and for the length of the connecting *corridor* on the adjacent floor leading to the *exit*.

Exceptions:

1. Foyers, lobbies or reception rooms constructed as required for *corridors* shall not be construed as intervening rooms.
2. Enclosed elevator lobbies as permitted by Item 1 of Section 1016.2 shall not be construed as intervening rooms.

SECTION 1021
EGRESS BALCONIES

1021.1 General. Balconies used for egress purposes shall conform to the same requirements as *corridors* for minimum width, required capacity, headroom, dead ends and projections.

[S] 1021.2 Wall separation. Exterior egress balconies shall be separated from the interior of the building by walls and opening protectives as required for *corridors*.

Exceptions:

1. Separation is not required where the exterior egress balcony is served by not less than two *stairways* and a dead-end travel condition does not require travel past an unprotected opening to reach a *stairway*.
2. Separation is not required in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.

1021.3 Openness. The long side of an egress balcony shall be not less than 50 percent open, and the open area above the *guards* shall be so distributed as to minimize the accumulation of smoke or toxic gases.

1021.4 Location. Exterior egress balconies shall have a minimum *fire separation distance* of 10 feet (3048 mm) measured at right angles from the exterior edge of the egress balcony to the following:

1. Adjacent *lot lines*.
2. Other portions of the building.
3. Other buildings on the same lot unless the adjacent building *exterior walls* and openings are protected in accordance with Section 705 based on *fire separation distance*.

For the purposes of this section, other portions of the building shall be treated as separate buildings.

SECTION 1022
EXITS

1022.1 General. *Exits* shall comply with Sections 1022 through 1027 and the applicable requirements of Sections 1003 through 1015. An *exit* shall not be used for any purpose that interferes with its function as a *means of egress*. Once a given level of *exit* protection is achieved, such level of protection shall not be reduced until arrival at the *exit discharge*. *Exits* shall be continuous from the point of entry into the *exit* to the *exit discharge*.

1022.2 Exterior exit doors. Buildings or structures used for human occupancy shall have not less than one exterior door that meets the requirements of Section 1010.1.1.

1022.2.1 Detailed requirements. Exterior *exit* doors shall comply with the applicable requirements of Section 1010.1.

1022.2.2 Arrangement. Exterior *exit* doors shall lead directly to the *exit discharge* or the *public way*.

SECTION 1023
INTERIOR EXIT STAIRWAYS AND RAMPS

1023.1 General. *Interior exit stairways* and *ramps* serving as an *exit* component in a *means of egress* system shall comply with the requirements of this section. *Interior exit stairways* and *ramps* shall be enclosed and lead directly to the exterior of the building or shall be extended to the exterior of the building with an *exit passageway* conforming to the requirements of Section 1024, except as permitted in Section 1028.1. An *interior exit stairway* or *ramp* shall not be used for any purpose other than as a *means of egress* and a circulation path.

[W][S] 1023.2 Construction. Enclosures for *interior exit stairways* and *ramps* shall be constructed as *fire barriers* in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. *Interior exit stairway* and *ramp* enclosures shall have a *fire-resistance rating* of not less than 2 hours where connecting more than four stories ((~~or more~~)) and not less than 1 hour where connecting ((~~less than~~)) four stories or less. The number of stories connected by the *interior exit stairways* or *ramps* shall include any *basements*, but not any *mezzanines*. *Interior exit stairways* and *ramps* shall have a *fire-resistance rating* not less than the floor assembly penetrated, but need not exceed 2 hours.

Exceptions:

1. *Interior exit stairways* and *ramps* in Group I-3 occupancies in accordance with the provisions of Section 408.3.8.
2. *Interior exit stairways* within an *atrium* enclosed in accordance with Section 404.6.
3. Interior exit stairway in accordance with Section 510.2.

1023.3 Termination. *Interior exit stairways* and *ramps* shall terminate at an *exit discharge* or a *public way*.

Exception: A combination of *interior exit stairways*, *interior exit ramps* and *exit passageways*, constructed in accordance with Sections 1023.2, 1023.3.1 and 1024, respectively, and forming a continuous protected enclosure, shall be permitted to extend an *interior exit stairway* or *ramp* to the *exit discharge* or a *public way*.

[S] 1023.3.1 Extension. Where *interior exit stairways* and *ramps* are extended to an *exit discharge* or a *public way* by an *exit passageway*, the *interior exit stairway* and *ramp* shall be separated from the *exit passageway* by a *fire barrier* constructed in accordance with Section 707 or a *horizontal assembly* constructed in accordance with Section 711, or both. The *fire-resistance rating* shall be not less than that required for the *interior exit stairway* and *ramp*. A *fire door* assembly complying with Section 716 shall be installed in the *fire barrier* to provide a *means of egress* from the *interior exit stairwa*y and *ramp* to the *exit passageway*. Openings in the *fire barrier* other than the *fire door* assembly are prohibited. Penetrations of the *fire barrier* are prohibited.

Exceptions:

1. Penetrations of the *fire barrier* in accordance with Section 1023.5 shall be permitted.
2. Separation between an *interior exit stairway* or *ramp* and the *exit passageway* extension shall not be required where there are no openings into the *exit passageway* extension.
3. Separation between an *interior exit stairway* or *ramp* and the *exit passageway* extension shall not be required where the *interior exit stairway* and the *exit passageway* extension are pressurized in accordance with Section 909.20.5.
4. A fire barrier and fire door assembly are not required to separate an *exit passageway* from a pressurized stairway.

1023.4 Openings. *Interior exit stairway* and *ramp* opening protectives shall be in accordance with the requirements of Section 716.

Openings in *interior exit stairways* and *ramps* other than unprotected exterior openings shall be limited to those required for *exit access* to the enclosure from normally occupied spaces and for egress from the enclosure.

Elevators shall not open into *interior exit stairways* and *ramps*.

Interpretation I1023.4: Accessory rooms such as restrooms, storage closets, laundry rooms, electrical, communication closets, mechanical rooms and similar spaces shall not open directly into an interior exit stairway. Rooms and spaces that are separated from the stairway by a *corridor* or a vestibule are not considered to open directly into the interior exit stairway. The *corridor* or vestibule shall be constructed as a minimum 1-hour fire-resistance rated fire partition complying with Section 708. Openings shall comply with Sections 716.2.2.1 and 716.3.2.1.

[W][S] 1023.5 Penetrations. Penetrations into or through *interior exit stairways* and *ramps* are prohibited except for the following:

1. Equipment and ductwork necessary for independent ventilation or pressurization.
2. *Fire protection systems*.
3. Security systems.
4. Two-way communication systems.
5. Electrical raceway for fire department communication systems and sprinkler monitoring terminating at a steel box not exceeding 16 square inches (0.010 m^2).
6. Electrical raceway serving the interior *exit stairway* and *ramp* and terminating at a steel box not exceeding 16 square inches (0.010 m^2).
7. Structural elements supporting the interior exit stairway or ramp or enclosure, such as beams or joists.

8. Piping used exclusively for the drainage of rainfall runoff from roof areas, provided the roof is not used for a helistop or heliport.
9. Unfired unit heaters required for freeze protection of fire protection equipment are permitted to penetrate one membrane; the conduit serving the heater is permitted to penetrate both membranes.
10. Equipment necessary for electrically controlled stairway door locks and security cameras are permitted to penetrate one membrane; the conduit serving the equipment is permitted to penetrate both membranes.

Such penetrations shall be protected in accordance with Section 714. There shall not be penetrations or communication openings, whether protected or not, between adjacent *interior exit stairways* and *ramps*.

Interpretation I1023.5: Ducts passing through interior exit stairways shall be separated from the stairway by construction having a fire-resistance rating at least equal to the stairway walls. At least one side of the duct enclosure shall abut the interior exit stairway enclosure.

Exception: Membrane penetrations shall be permitted on the outside of the *interior exit stairway* and *ramp*. Such penetrations shall be protected in accordance with Section 714.4.2.

1023.6 Ventilation. Equipment and ductwork for *interior exit stairway* and *ramp* ventilation as permitted by Section 1023.5 shall comply with one of the following items:

1. Such equipment and ductwork shall be located exterior to the building and shall be directly connected to the *interior exit stairway* and *ramp* by ductwork enclosed in construction as required for shafts.
2. Where such equipment and ductwork is located within the *interior exit stairway* and *ramp*, the intake air shall be taken directly from the outdoors and the exhaust air shall be discharged directly to the outdoors, or such air shall be conveyed through ducts enclosed in construction as required for shafts.
3. Where located within the building, such equipment and ductwork shall be separated from the remainder of the building, including other mechanical equipment, with construction as required for shafts.

In each case, openings into the *fire-resistance-rated* construction shall be limited to those needed for maintenance and operation and shall be protected by opening protectives in accordance with Section 716 for shaft enclosures.

The *interior exit stairway* and *ramp* ventilation systems shall be independent of other building ventilation systems.

1023.7 Interior exit stairway and ramp exterior walls. *Exterior walls* of the *interior exit stairway* or *ramp* shall comply with the requirements of Section 705 for *exterior walls*. Where nonrated walls or unprotected openings enclose the exterior of the *stairway* or *ramps* and the walls or openings are exposed by other parts of the building at an angle of less than 180 degrees (3.14 rad), the building *exterior walls* within 10 feet (3048 mm) horizontally of a nonrated wall or unprotected opening shall have a *fire-resistance rating* of not less than 1 hour. Openings within such *exterior* walls shall be protected by opening protectives having a *fire protection rating* of not less than 3/4 hour. This construction shall extend vertically from the ground to a point 10 feet (3048 mm) above the topmost landing of the *stairway* or *ramp*, or to the roof line, whichever is lower.

1023.8 Discharge identification. An *interior exit stairway* and *ramp* shall not continue below its *level of exit discharge* unless an *approved* barrier is provided at the *level of exit discharge* to prevent persons from unintentionally continuing into levels below. Directional exit signs shall be provided as specified in Section 1013.

[S] 1023.9 Stairway identification signs. A sign shall be provided at each floor landing in an *interior exit stairway* and *ramp* connecting more than three stories designating the floor level, the terminus of the top and bottom of the *interior exit stairway* and *ramp* and the identification of the *stairway* or *ramp*. The signage shall state the story of and direction to the *exit discharge*, and ((~~the availability of~~)) whether there is roof access from the *interior exit stairway* and *ramp* for the fire department, and whether the roof access is accessed by roof hatch. The sign shall be located 5 feet (1524 mm) above the floor landing in a position that is readily visible when the doors are in the open and closed positions. In addition to the *stairway* identification sign, a floor-level sign in visual characters, raised characters and braille complying with *ICC A117.1* shall be located at each floor-level landing adjacent to the door leading from the *interior exit stairway* and *ramp* into the *corridor* to identify the floor level.

1023.9.1 Signage requirements. *Stairway* identification signs shall comply with all of the following requirements:

1. The signs shall be a minimum size of 18 inches (457 mm) by 12 inches (305 mm).
2. The letters designating the identification of the *interior exit stairway* and *ramp* shall be not less than 1-1/2 inches (38 mm) in height.
3. The number designating the floor level shall be not less than 5 inches (127 mm) in height and located in the center of the sign.
4. Other lettering and numbers shall be not less than 1 inch (25 mm) in height.
5. Characters and their background shall have a nonglare finish. Characters shall contrast with their background, with either light characters on a dark background or dark characters on a light background.

6. Where signs required by Section 1023.9 are installed in the *interior exit stairways* and *ramps* of buildings subject to Section 1025, the signs shall be made of the same materials as required by Section 1025.4.

1023.10 Elevator lobby identification signs. At landings in *interior exit stairways* where two or more doors lead to the floor level, any door with direct access to an enclosed elevator lobby shall be identified by signage located on the door or directly adjacent to the door stating "Elevator Lobby." Signage shall be in accordance with Section 1023.9.1, Items 4, 5 and 6.

[W][S] 1023.11 ((~~Smokeproof enclosures~~)) Pressurized stairways. Where required by Section 403.5.4, 405.7.2, ((~~or~~)) 412.2.2.1 or 510.2, *interior exit stairways* and *ramps* shall be ((~~*smokeproof enclosures*~~)) pressurized in accordance with Section 909.20.5 or 909.20.6.

1023.11.1 Termination and extension. A ((~~*smokeproof enclosure*~~)) pressurized stairway shall terminate at an *exit discharge* or a *public way*. The ((~~*smokeproof enclosure*~~)) pressurized stairway shall be permitted to be extended by an *exit passageway* in accordance with Section 1023.3. ((~~The *exit passageway* shall be without openings other than the *fire door assembly* required by Section 1023.3.1 and those necessary for egress from the *exit passageway*.~~)) The *exit passageway* shall be separated from the remainder of the building by 2-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. The *exit passageway* shall be protected and pressurized in the same manner as the pressurized stairway.

((~~**Exceptions:**~~

~~1. Openings in the *exit passageway* serving a *smokeproof enclosure* are permitted where the *exit passageway* is protected and pressurized in the same manner as the *smokeproof enclosure*, and openings are protected as required for access from other floors.~~

~~2. The *fire barrier* separating the *smokeproof enclosure* from the *exit passageway* is not required, provided that the *exit passageway* is protected and pressurized in the same manner as the *smokeproof enclosure*.~~

~~**3.**~~)) **Exception:** A ((~~*smokeproof enclosure*~~)) pressurized stairway shall be permitted to egress through areas on the *level of exit discharge* or vestibules as permitted by Section 1028.

((~~**1023.11.2 Enclosure access.** Access to the *stairway* or *ramp* within a *smokeproof enclosure* shall be by way of a vestibule or an open exterior balcony.~~

~~**Exception:** Access is not required by way of a vestibule or exterior balcony for *stairways* and *ramps* using the pressurization alternative complying with Section 909.20.5.~~))

1023.12 Standpipes. Standpipes and standpipe hose connections shall be provided where required by Sections 905.3 and 905.4.

[S] 1023.13 Equipment in interior exit stairways. Equipment is prohibited in interior exit stairways except for equipment necessary for independent pressurization, lighting of the interior exit stairway, sprinkler piping, standpipes, electrical equipment for fire department communication and sprinkler monitoring, and unit heaters required to protect fire protection equipment from freezing.

SECTION 1024
EXIT PASSAGEWAYS

1024.1 Exit passageways. *Exit passageways* serving as an exit component in a *means of egress* system shall comply with the requirements of this section. An *exit passageway* shall not be used for any purpose other than as a *means of egress* and a *circulation path*.

1024.2 Width and capacity. The required capacity of *exit passageways* shall be determined as specified in Section 1005.1 but the minimum width shall be not less than 44 inches (1118 mm), except that *exit passageways* serving an occupant load of less than 50 shall be not less than 36 inches (914 mm) in width. The minimum width or required capacity of *exit passageways* shall be unobstructed.

Exception: Encroachments complying with Section 1005.7.

1024.3 Construction. *Exit passageway* enclosures shall have walls, floors and ceilings of not less than a 1-hour *fire-resistance rating*, and not less than that required for any connecting *interior exit stairway* or *ramp*. *Exit passageways* shall be constructed as *fire barriers* in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both.

1024.4 Termination. *Exit passageways* on the *level of exit discharge* shall terminate at an *exit discharge*. *Exit passageways* on other levels shall terminate at an *exit*.

[S] 1024.5 Openings. *Exit passageway* opening protectives shall be in accordance with the requirements of Section 716.

((~~Except as permitted in Section 402.8.7, openings in *exit passageways* other than unprotected exterior openings shall be limited to those necessary for *exit access* to the *exit passageway* from normally occupied spaces and for egress from the *exit passageway*.~~))

The following openings are permitted in *exit passageways*:

1. Doors from rooms and spaces in accordance with Section 402.8.7;
2. Unprotected exterior openings;
3. Doors necessary for exit access from normally occupied spaces;
4. Doors necessary for egress from the *exit passageway*;
5. Doors from interior exit stairways.

Where an *interior exit stairway* or *ramp* is extended to an *exit discharge* or a *public way* by an *exit passageway*, the *exit passageway* shall comply with Section 1023.3.1.

Elevators shall not open into an *exit passageway*.

Interpretation I1024.5: Accessory rooms such as restrooms, storage closets, laundry rooms, electrical, communication closets, mechanical rooms and similar spaces shall not open directly into an *exit passageway*. Rooms and spaces that are separated from the *exit passageway* by a *corridor* or a vestibule are not considered to open directly into the *exit passageway*. The *corridor* or vestibule shall be constructed as a minimum 1-hour fire-resistance rated fire partition complying with Section 708. Openings shall comply with Sections 716.2.2.1 and 716.3.2.1.

Code Alternate CA1024.5: An elevator is permitted to open into an *exit passageway* when the following conditions are met:

1. A lobby shall separate the elevator from the *exit passageway*. This is allowed at only one location in the building. The lobby is required whether the elevator hoistway is pressurized or not.
2. The separation shall be constructed as a fire barrier having a fire-resistive rating and opening protectives as for the *exit passageway*. The door between the lobby and the *exit passageway* shall also comply with Section 716.2.2.1. The door shall have listed gaskets installed at head, jambs and meeting edges. This only applies to the walls common with the *exit passageway*.
3. The lobby shall have a minimum depth of 36 inches. (Note that areas of refuge may require a larger dimension).
4. An elevator lobby constructed as a smoke partition shall be provided at every floor below the level of the *exit passageway* served by the elevator. Hoistway pressurization is permitted to be used in lieu of the lobbies on floors below the level of the *exit passageway*.
5. A door as required by Section 1023.3.1 between an interior exit stairway and the *exit passageway* shall be provided.
6. An *automatic sprinkler system* in accordance with Section 903.3.1.1 shall be provided throughout the floor on which the *exit passageway* is located.

This alternate does not apply to interior exit stairways.

[S] 1024.6 Penetrations. Penetrations into or through an *exit passageway* are prohibited except for the following:

1. Equipment and ductwork necessary for independent pressurization.
2. Fire protection systems.
3. Security systems.
4. Two-way communication systems.
5. Electrical raceway for fire department communication.
6. Electrical raceway serving the *exit passageway* and terminating at a steel box not exceeding 16 square inches (0.010 m^2).

Such penetrations shall be protected in accordance with Section 714. There shall not be penetrations or communicating openings, whether protected or not, between adjacent *exit passageways*.

Exceptions:

1. Membrane penetrations shall be permitted on the outside of the *exit passageway*. Such penetrations shall be protected in accordance with Section 714.4.2.
2. Unfired unit heaters allowed by Section 1023.13 to be installed in interior exit stairways are permitted to penetrate one membrane. The conduit serving the heater is permitted to penetrate both membranes.

1024.7 Ventilation. Equipment and ductwork for *exit passageway* ventilation as permitted by Section 1024.6 shall comply with one of the following:

1. The equipment and ductwork shall be located exterior to the building and shall be directly connected to the *exit passageway* by ductwork enclosed in construction as required for shafts.
2. Where the equipment and ductwork is located within the *exit passageway*, the intake air shall be taken directly from the outdoors and the exhaust air shall be discharged directly to the outdoors, or the air shall be conveyed through ducts enclosed in construction as required for shafts.
3. Where located within the building, the equipment and ductwork shall be separated from the remainder of the building, including other mechanical equipment, with construction as required for shafts.

In each case, openings into the fire-resistance-rated construction shall be limited to those needed for maintenance and operation and shall be protected by opening protectives in accordance with Section 716 for shaft enclosures.

Exit passageway ventilation systems shall be independent of other building ventilation systems.

1024.8 Standpipes. Standpipes and standpipe hose connections shall be provided where required by Sections 905.3 and 905.4.

[W] 1024.9 Exit passageway exterior walls. Exterior walls of the exit passageway shall comply with Section 705. Where nonrated walls or unprotected openings enclose the exterior of the exit passageway and the walls or openings are exposed by other parts of the building at an angle of less than 180 degrees (3.14 rad), the building exterior walls within 10 feet (3048 mm) horizontally of a nonrated wall or unprotected opening shall have a *fire-resistance rating* of not less than 1 hour. Openings within such exterior walls shall be protected by opening protectives having a fire-protection rating of not less than 3/4 hour. This construction shall extend vertically from the ground to a point 10 feet (3048 mm) above the floor of the exit passageway, or to the roof line, whichever is lower.

SECTION 1025
LUMINOUS EGRESS PATH MARKINGS

1025.1 General. *Approved* luminous egress path markings delineating the exit path shall be provided in *high-rise buildings* of Group A, B, E, I-1, M or R-1 occupancies in accordance with this section.

Exception: Luminous egress path markings shall not be required on the *level of exit discharge* in lobbies that serve as part of the exit path in accordance with Section 1028.1, Exception 1.

1025.2 Markings within exit components. Egress path markings shall be provided in *interior exit stairways*, *interior exit ramps* and *exit passageways*, in accordance with Sections 1025.2.1 through 1025.2.6.

1025.2.1 Steps. A solid and continuous stripe shall be applied to the horizontal leading edge of each step and shall extend for the full length of the step. Outlining stripes shall have a minimum horizontal width of 1 inch (25 mm) and a maximum width of 2 inches (51 mm). The leading edge of the stripe shall be placed not more than 1/2 inch (12.7 mm) from the leading edge of the step and the stripe shall not overlap the leading edge of the step by not more than 1/2 inch (12.7 mm) down the vertical face of the step.

Exception: The minimum width of 1 inch (25 mm) shall not apply to outlining stripes *listed* in accordance with UL 1994.

1025.2.2 Landings. The leading edge of landings shall be marked with a stripe consistent with the dimensional requirements for steps.

1025.2.3 Handrails. *Handrails* and handrail extensions shall be marked with a solid and continuous stripe having a minimum width of 1 inch (25 mm). The stripe shall be placed on the top surface of the *handrail* for the entire length of the *handrail*, including extensions and newel post caps. Where *handrails* or handrail extensions bend or turn corners, the stripe shall not have a gap of more than 4 inches (102 mm).

Exception: The minimum width of 1 inch (25 mm) shall not apply to outlining stripes *listed* in accordance with UL 1994.

1025.2.4 Perimeter demarcation lines. Stair landings and other floor areas within *interior exit stairways*, *interior exit ramps* and *exit passageways*, with the exception of the sides of steps, shall be provided with solid and continuous demarcation lines on the floor or on the walls or a combination of both. The stripes shall be 1 to 2 inches (25 mm to 51 mm) wide with interruptions not exceeding 4 inches (102 mm).

Exception: The minimum width of 1 inch (25 mm) shall not apply to outlining stripes *listed* in accordance with UL 1994.

1025.2.4.1 Floor-mounted demarcation lines. Perimeter demarcation lines shall be placed within 4 inches (102 mm) of the wall and shall extend to within 2 inches (51 mm) of the markings on the leading edge of landings. The demarcation lines shall continue across the floor in front of all doors.

Exception: Demarcation lines shall not extend in front of *exit discharge* doors that lead out of an *exit* and through which occupants must travel to complete the exit path.

1025.2.4.2 Wall-mounted demarcation lines. Perimeter demarcation lines shall be placed on the wall with the bottom edge of the stripe not more than 4 inches (102 mm) above the finished floor. At the top or bottom of the *stairs*, demarcation lines shall drop vertically to the floor within 2 inches (51 mm) of the step or landing edge. Demarcation lines on walls

shall transition vertically to the floor and then extend across the floor where a line on the floor is the only practical method of outlining the path. Where the wall line is broken by a door, demarcation lines on walls shall continue across the face of the door or transition to the floor and extend across the floor in front of such door.

Exception: Demarcation lines shall not extend in front of *exit discharge* doors that lead out of an *exit* and through which occupants must travel to complete the exit path.

1025.2.4.3 Transition. Where a wall-mounted demarcation line transitions to a floor-mounted demarcation line, or vice versa, the wall-mounted demarcation line shall drop vertically to the floor to meet a complimentary extension of the floor-mounted demarcation line, thus forming a continuous marking.

1025.2.5 Obstacles. Obstacles at or below 6 feet 6 inches (1981 mm) in height and projecting more than 4 inches (102 mm) into the egress path shall be outlined with markings not less than 1 inch (25 mm) in width comprised of a pattern of alternating equal bands, of luminous material and black, with the alternating bands not more than 2 inches (51 mm) thick and angled at 45 degrees (0.79 rad). Obstacles shall include, but are not limited to, standpipes, hose cabinets, wall projections and restricted height areas. However, such markings shall not conceal any required information or indicators including but not limited to instructions to occupants for the use of standpipes.

Exception: The minimum width of 1 inch (25 mm) shall not apply to markings *listed* in accordance with UL 1994.

[S] 1025.2.6 Doors within the exit path. Doors through which occupants must pass in order to complete the exit path shall be provided with markings complying with Sections 1025.2.6.1 through 1025.2.6.3.

Exception: Main exterior exit doors or gates that are obviously and clearly identifiable as exits need not be provided with markings where *approved* by the *building official.*

1025.2.6.1 Emergency exit symbol. The doors shall be identified by a low-location luminous emergency exit symbol complying with NFPA 170. The exit symbol shall be not less than 4 inches (102 mm) in height and shall be mounted on the door, centered horizontally, with the top of the symbol not higher than 18 inches (457 mm) above the finished floor.

1025.2.6.2 Door hardware markings. Door hardware shall be marked with not less than 16 square inches (406 mm^2) of luminous material. This marking shall be located behind, immediately adjacent to, or on the door handle or escutcheon. Where a panic bar is installed, such material shall be not less than 1 inch (25 mm) wide for the entire length of the actuating bar or touchpad.

1025.2.6.3 Door frame markings. The top and sides of the door frame shall be marked with a solid and continuous 1-inch- to 2-inch-wide (25 mm to 51 mm) stripe. Where the door molding does not provide sufficient flat surface on which to locate the stripe, the stripe shall be permitted to be located on the wall surrounding the frame.

1025.3 Uniformity. Placement and dimensions of markings shall be consistent and uniform throughout the same enclosure.

1025.4 Self-luminous and photoluminescent. Luminous egress path markings shall be permitted to be made of any material, including paint, provided that an electrical charge is not required to maintain the required luminance. Such materials shall include, but not be limited to, *self-luminous* materials and *photoluminescent* materials. Materials shall comply with either of the following standards:

1. UL 1994.
2. ASTM E2072, except that the charging source shall be 1 footcandle (11 lux) of fluorescent illumination for 60 minutes, and the minimum luminance shall be 30 milicandelas per square meter at 10 minutes and 5 milicandelas per square meter after 90 minutes.

1025.5 Illumination. Where *photoluminescent* exit path markings are installed, they shall be provided with not less than 1 footcandle (11 lux) of illumination for not less than 60 minutes prior to periods when the building is occupied and continuously during occupancy.

SECTION 1026
HORIZONTAL EXITS

1026.1 Horizontal exits. *Horizontal exits* serving as an *exit* in a *means of egress* system shall comply with the requirements of this section. A *horizontal exit* shall not serve as the only *exit* from a portion of a building, and where two or more *exits* are required, not more than one-half of the total number of *exits* or total *exit* minimum width or required capacity shall be *horizontal exits*.

Exceptions:

1. *Horizontal exits* are permitted to comprise two-thirds of the required *exits* from any building or floor area for occupancies in Group I-2.

2. *Horizontal exits* are permitted to comprise 100 percent of the *exits* required for occupancies in Group I-3. Not less than 6 square feet (0.6 m^2) of accessible space per occupant shall be provided on each side of the *horizontal exit* for the total number of people in adjoining compartments.

1026.2 Separation. The separation between buildings or refuge areas connected by a *horizontal exit* shall be provided by a *fire wall* complying with Section 706; or by a *fire barrier* complying with Section 707 or a *horizontal assembly* complying with Section 711, or both. The minimum *fire-resistance rating* of the separation shall be 2 hours. Opening protectives in *horizontal exits* shall also comply with Section 716. Duct and air transfer openings in a *fire wall* or *fire barrier* that serves as a *horizontal exit* shall also comply with Section 717. The *horizontal exit* separation shall extend vertically through all levels of the building unless floor assemblies have a *fire-resistance rating* of not less than 2 hours and do not have unprotected openings.

Exception: A *fire-resistance rating* is not required at *horizontal exits* between a building area and an above-grade *pedestrian walkway* constructed in accordance with Section 3104, provided that the distance between connected buildings is more than 20 feet (6096 mm).

Horizontal exits constructed as *fire barriers* shall be continuous from *exterior wall* to *exterior wall* so as to divide completely the floor served by the *horizontal exit*.

1026.3 Opening protectives. *Fire doors* in *horizontal exits* shall be self-closing or automatic-closing when activated by a *smoke detector* in accordance with Section 716.2.6.6. Doors, where located in a cross-corridor condition, shall be automatic-closing by activation of a *smoke detector* installed in accordance with Section 716.2.6.6.

1026.4 Refuge area. The refuge area of a *horizontal exit* shall be a space occupied by the same tenant or a public area and each such refuge area shall be adequate to accommodate the original *occupant load* of the refuge area plus the *occupant load* anticipated from the adjoining compartment. The anticipated *occupant load* from the adjoining compartment shall be based on the capacity of the *horizontal exit doors* entering the refuge area or the total *occupant load* of the adjoining compartment, whichever is less.

1026.4.1 Capacity. The capacity of the refuge area shall be computed based on a *net floor area* allowance of 3 square feet (0.2787 m^2) for each occupant to be accommodated therein. Where the *horizontal exit* also forms a *smoke compartment*, the capacity of the refuge area for Group I-1, I-2 and I-3 occupancies and Group B *ambulatory care facilities* shall comply with Sections 407.5.3, 408.6.2, 420.6.1 and 422.3.2 as applicable.

1026.4.2 Number of exits. The refuge area into which a *horizontal exit* leads shall be provided with *exits* adequate to meet the occupant requirements of this chapter, but not including the added *occupant load* imposed by persons entering the refuge area through *horizontal exits* from other areas. Not less than one refuge area exit shall lead directly to the exterior or to an *interior exit stairway* or *ramp.*

Exception: The adjoining compartment shall not be required to have a *stairway* or door leading directly outside, provided that the refuge area into which a *horizontal exit* leads has *stairways* or doors leading directly outside and are so arranged that egress shall not require the occupants to return through the compartment from which egress originates.

1026.5 Standpipes. Standpipes and standpipe hose connections shall be provided where required by Sections 905.3 and 905.4.

SECTION 1027
EXTERIOR EXIT STAIRWAYS AND RAMPS

1027.1 Exterior exit stairways and ramps. *Exterior exit stairways* and *ramps* serving as an element of a required *means of egress* shall comply with this section.

1027.2 Use in a means of egress. *Exterior exit stairways* shall not be used as an element of a required *means of egress* for Group I-2 occupancies. For occupancies in other than Group I-2, *exterior exit stairways* and *ramps* shall be permitted as an element of a required *means of egress* for buildings not exceeding six stories above *grade plane* or that are not *high-rise buildings*.

[S] 1027.3 Open side. *Exterior exit stairways* and *ramps* serving as an element of a required *means of egress* shall be at least 50 percent open on not less than one side. ((~~, except for required structural columns, beams, *handrails* and *guards*.~~)) An open side shall have not less than ((~~35 square feet (3.3 m^2)~~)) 28 square feet (2.6 m^2) of aggregate open area adjacent to each floor level. ((~~and the level of each intermediate landing. The required open area shall be located not less than 42 inches (1067 mm) above the adjacent floor or landing level.~~)) The open area shall be distributed to prevent accumulation of smoke or toxic gases.

1027.4 Side yards. The open areas adjoining *exterior exit stairways* or *ramps* shall be either *yards*, *courts* or *public ways*; the remaining sides are permitted to be enclosed by the *exterior walls* of the building.

1027.5 Location. *Exterior exit stairways* and *ramps* shall have a minimum fire separation distance of 10 feet (3048 mm) measured at right angles from the exterior edge of the *stairway* or *ramps*, including landings, to:

1. Adjacent *lot lines*.
2. Other portions of the building.

3. Other buildings on the same lot unless the adjacent building *exterior walls* and openings are protected in accordance with Section 705 based on *fire separation distance.*

For the purposes of this section, other portions of the building shall be treated as separate buildings.

Exception: *Exterior exit stairways* and *ramps* serving individual *dwelling units* of Group R-3 shall have a minimum *fire separation distance* of 5 feet (1525 mm).

1027.6 Exterior exit stairway and ramp protection. *Exterior exit stairways* and *ramps* shall be separated from the interior of the building as required in Section 1023.2. Openings shall be limited to those necessary for egress from normally occupied spaces. Where a vertical plane projecting from the edge of an *exterior exit stairway* or *ramp* and landings is exposed by other parts of the building at an angle of less than 180 degrees (3.14 rad), the exterior wall shall be rated in accordance with Section 1023.7.

Exceptions:

1. Separation from the interior of the building is not required for occupancies, other than those in Group R-1 or R-2, in buildings that are not more than two stories above *grade plane* where a *level of exit discharge* serving such occupancies is the first story above *grade plane*.
2. Separation from the interior of the building is not required where the *exterior exit stairway* or *ramp* is served by an *exterior exit ramp* or balcony that connects two remote *exterior exit stairways* or other *approved exits* with a perimeter that is not less than 50 percent open. To be considered open, the opening shall be not less than 50 percent of the height of the enclosing wall, with the top of the openings not less than 7 feet (2134 mm) above the top of the balcony.
3. Separation from the open-ended *corridor* of the building is not required for *exterior exit stairways* or *ramps*, provided that Items 3.1 through 3.5 are met:
   - 3.1. The building, including open-ended *corridors*, and *stairways* and *ramps*, shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.
   - 3.2. The open-ended *corridors* comply with Section 1020.
   - 3.3. The open-ended *corridors* are connected on each end to an *exterior exit stairway* or *ramp* complying with Section 1027.
   - 3.4. The *exterior walls* and openings adjacent to the *exterior exit stairway* or *ramp* comply with Section 1023.7 <u>and 1027.7</u>.
   - 3.5. At any location in an open-ended *corridor* where a change of direction exceeding 45 degrees (0.79 rad) occurs, a clear opening of not less than 35 square feet (3.3 m^2) or an *exterior stairway* or *ramp* shall be provided. Where clear openings are provided, they shall be located so as to minimize the accumulation of smoke or toxic gases.
4. In Group R-3 occupancies not more than four stories in height, *exterior exit stairways* and *ramps* serving individual *dwelling units* are not required to be separated from the interior of the building where the *exterior exit stairway* or *ramp* discharges directly to grade.

<u>**[S] 1027.7 Exterior exit stairway and ramp exterior walls.** Where nonrated walls or unprotected openings enclose the exterior of the stairway and the walls or openings are exposed by other parts of the building at an angle of less than 180 degrees (3.14 rad), the building exterior walls within 10 feet (3048 mm) horizontally of a nonrated wall or unprotected opening shall have a fire-resistance rating of not less than 1 hour. Openings within such exterior walls shall be protected by opening protectives having a fire protection rating of not less than 3/4 hour. This construction shall extend vertically from the ground to a point 10 feet (3048 mm) above the topmost landing of the stairway or to the roof line, whichever is lower.</u>

SECTION 1028
EXIT DISCHARGE

[S] 1028.1 General. *Exits* shall discharge directly to the exterior of the building. The *exit discharge* shall be at grade or shall provide a direct path of egress travel to grade. The *exit discharge* shall not reenter a building <u>except into an exit or as otherwise *approved* by the *building official*</u>. The combined use of Exceptions 1 and 2 shall not exceed 50 percent of the number and minimum width or required capacity of the required exits.

Exceptions:

1. Not more than 50 percent of the number and minimum width or required capacity of *interior exit stairways* and *ramps* is permitted to egress through areas on the level of discharge provided that all of the following conditions are met:
   - 1.1. Discharge of *interior exit stairways* and *ramps* shall be provided with a free and unobstructed path of travel to an exterior *exit* door and such *exit* is readily visible and identifiable from the point of termination of the enclosure.

1.2. The entire area of the *level of exit discharge* is separated from areas below by construction conforming to the *fire-resistance rating* for the enclosure.

1.3. The egress path from the *interior exit stairway* and *ramp* on the *level of exit discharge* is protected throughout by an *approved automatic sprinkler system*. Portions of the *level of exit discharge* with access to the egress path shall be either equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, or separated from the egress path in accordance with the requirements for the enclosure of *interior exit stairways* or *ramps*.

1.4. Where a required *interior exit stairway* or *ramp* and an *exit access stairway* or *ramp* serve the same floor level and terminate at the same *level of exit discharge*, the termination of the *exit access stairway* or *ramp* and the *exit discharge* door of the *interior exit stairway* or *ramp* shall be separated by a distance of not less than 30 feet (9144 mm) or not less than one-fourth the length of the maximum overall diagonal dimension of the building, whichever is less. The distance shall be measured in a straight line between the *exit discharge* door from the *interior exit stairway* or *ramp* and the last tread of the *exit access stairway* or termination of slope of the *exit access ramp*.

2. Not more than 50 percent of the number and minimum width or required capacity of the *interior exit stairways* and *ramps* is permitted to egress through a vestibule provided that all of the following conditions are met:

2.1. The entire area of the vestibule is separated from areas below by construction conforming to the *fire-resistance rating* of the *interior exit stairway* or *ramp enclosure*.

2.2. The depth from the exterior of the building is not greater than 10 feet (3048 mm) and the ((~~length~~)) width is not greater than 30 feet (9144 mm).

2.3. The area is separated from the remainder of the *level of exit discharge* by a *fire partition* constructed in accordance with Section 708.

Exception: The maximum transmitted temperature rise is not required.

2.4. The area is used only for *means of egress* and *exits* directly to the outside.

Interpretation I1028.1: Exception 2 applies only to vestibules with *direct access* from the *interior exit stairway* or *ramp*.

3. *Horizontal exits* complying with Section 1026 shall not be required to discharge directly to the exterior of the building.

[S] 1028.1.1 Remoteness of egress paths at building exterior. The paths of egress travel from separate exits shall be separated by at least 10 feet at the exterior of the building. The separation shall be maintained for at least 10 feet, as measured from the face of the exterior wall containing the exits, before the paths of egress travel are permitted to converge. The paths of egress travel, before and after convergence, shall provide unobstructed access to a *public way*. Where 3 or more exits are required, at least 2 paths shall be arranged in accordance with this provision.

1028.2 Exit discharge width or capacity. The minimum width or required capacity of the *exit discharge* shall be not less than the minimum width or required capacity of the *exits* being served.

1028.3 Exit discharge components. *Exit discharge* components shall be sufficiently open to the exterior so as to minimize the accumulation of smoke and toxic gases.

1028.4 Egress courts. *Egress courts* serving as a portion of the *exit discharge* in the *means of egress* system shall comply with the requirements of Sections 1028.4.1 and 1028.4.2.

1028.4.1 Width or capacity. The required capacity of *egress courts* shall be determined as specified in Section 1005.1, but the minimum width shall be not less than 44 inches (1118 mm), except as specified herein. *Egress courts* serving Group R-3 and U occupancies shall be not less than 36 inches (914 mm) in width. The required capacity and width of *egress courts* shall be unobstructed to a height of 7 feet (2134 mm).

The width of the *egress court* shall be not less than the required capacity.

Exception: Encroachments complying with Section 1005.7.

[S] 1028.4.2 Construction and openings. Where an *egress court* serving a building or portion thereof is less than 10 feet (3048 mm) in width, the *egress court* walls shall have not less than 1-hour *fire-resistance-rated* construction for a distance of 10 feet (3048 mm) above the floor of the *egress court*. Openings within such walls shall be protected by opening protectives having a fire protection rating of not less than 3/4 hour.

Exceptions:

1. *Egress courts* serving an *occupant load* of less than 10.
2. *Egress courts* serving Group R-3.
3. In buildings other than those which have a single means of egress under Section 1006.3.3 item 7, opening protection need not be provided where it is possible to exit in two directions from the *court*.

[S] 1028.5 Access to a public way. The *exit discharge* shall provide a direct and unobstructed access to a *public way*. Converging paths of egress travel located in the *exit discharge* are permitted under the conditions of 1028.1.1.

Exception: Where access to a *public way* cannot be provided, a safe dispersal area shall be provided where all of the following are met:

1. The area shall be of a size to accommodate not less than 5 square feet (0.46 m^2) for each person.
2. The area shall be located on the same lot not less than 50 feet (15 240 mm) away from the building requiring egress.
3. The area shall be permanently maintained and identified as a safe dispersal area.
4. The area shall be provided with a safe and unobstructed path of travel from the building.

SECTION 1029
ASSEMBLY

1029.1 General. A room or space used for assembly purposes that contains seats, tables, displays, equipment or other material shall comply with this section.

1029.1.1 Bleachers. *Bleachers*, *grandstands* and *folding and telescopic seating*, that are not building elements, shall comply with ICC 300.

1029.1.1.1 Spaces under grandstands and bleachers. Spaces under *grandstands* or *bleachers* shall be separated by *fire barriers* complying with Section 707 and *horizontal assemblies* complying with Section 711 with not less than 1-hour *fire-resistance-rated* construction.

Exceptions:

1. Ticket booths less than 100 square feet (9.29 m^2) in area.
2. Toilet rooms.
3. Other accessory use areas 1,000 square feet (92.9 m^2) or less in area and equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

1029.2 Assembly main exit. A building, room or space used for assembly purposes that has an *occupant load* of greater than 300 and is provided with a main *exit*, that main *exit* shall be of sufficient capacity to accommodate not less than one-half of the *occupant load*, but such capacity shall be not less than the total required capacity of all *means of egress* leading to the *exit*. Where the building is classified as a Group A occupancy, the main *exit* shall front on not less than one street or an unoccupied space of not less than 10 feet (3048 mm) in width that adjoins a street or *public way*. In a building, room or space used for assembly purposes where there is not a well-defined main *exit* or where multiple main *exits* are provided, *exits* shall be permitted to be distributed around the perimeter of the building provided that the total capacity of egress is not less than 100 percent of the required capacity.

1029.3 Assembly other exits. In addition to having access to a main *exit*, each level in a building used for assembly purposes having an *occupant load* greater than 300 and provided with a main *exit*, shall be provided with additional *means of egress* that shall provide an egress capacity for not less than one-half of the total *occupant load* served by that level and shall comply with Section 1007.1. In a building used for assembly purposes where there is not a well-defined main *exit* or where multiple main *exits* are provided, *exits* for each level shall be permitted to be distributed around the perimeter of the building, provided that the total width of egress is not less than 100 percent of the required width.

1029.4 Foyers and lobbies. In Group A-1 occupancies, where persons are admitted to the building at times when seats are not available, such persons shall be allowed to wait in a lobby or similar space, provided that such lobby or similar space shall not encroach on the minimum width or required capacity of the *means of egress*. Such foyer, if not directly connected to a public street by all the main entrances or *exits*, shall have a straight and unobstructed *corridor* or path of travel to every such main entrance or *exit*.

1029.5 Interior balcony and gallery means of egress. For balconies, galleries or press boxes having a seating capacity of 50 or more located in a building, room or space used for assembly purposes, not less than two *means of egress* shall be provided, with one from each side of every balcony, gallery or press box.

1029.6 Capacity of aisle for assembly. The required capacity of *aisles* shall be not less than that determined in accordance with Section 1029.6.1 where *smoke-protected assembly seating* is not provided, Section 1029.6.2 where *smoke-protected assembly seating* is provided and Section 1029.6.3 where *open-air assembly seating* is provided.

1029.6.1 Without smoke protection. The required capacity in inches (mm) of the *aisles* for assembly seating without smoke protection shall be not less than the *occupant load* served by the egress element in accordance with all of the following, as applicable:

1029.17 Assembly guards. *Guards* adjacent to seating in a building, room or space used for assembly purposes shall be provided where required by Section 1015 and shall be constructed in accordance with Section 1015 except where provided in accordance with Sections 1029.17.1 through 1029.17.4. At *bleachers*, *grandstands* and *folding and telescopic seating*, *guards* must be provided where required by ICC 300 and Section 1029.17.1.

1029.17.1 Perimeter guards. Perimeter *guards* shall be provided where the footboards or walking surface of seating facilities are more than 30 inches (762 mm) above the floor or grade below. Where the seatboards are adjacent to the perimeter, *guard* height shall be 42 inches (1067 mm) high minimum, measured from the seatboard. Where the seats are self-rising, *guard* height shall be 42 inches (1067 mm) high minimum, measured from the floor surface. Where there is an *aisle* between the seating and the perimeter, the *guard* height shall be measured in accordance with Section 1015.3.

Exceptions:

1. *Guards* that impact sightlines shall be permitted to comply with Section 1029.17.3.
2. *Bleachers*, *grandstands* and *folding and telescopic seating* shall not be required to have perimeter *guards* where the seating is located adjacent to a wall and the space between the wall and the seating is less than 4 inches (102 mm).

1029.17.2 Cross aisles. Cross *aisles* located more than 30 inches (762 mm) above the floor or grade below shall have *guards* in accordance with Section 1015.

Where an elevation change of 30 inches (762 mm) or less occurs between a cross *aisle* and the adjacent floor or grade below, *guards* not less than 26 inches (660 mm) above the *aisle* floor shall be provided.

Exception: Where the backs of seats on the front of the cross *aisle* project 24 inches (610 mm) or more above the adjacent floor of the *aisle*, a *guard* need not be provided.

1029.17.3 Sightline-constrained guard heights. Unless subject to the requirements of Section 1029.17.4, a fascia or railing system in accordance with the *guard* requirements of Section 1015 and having a minimum height of 26 inches (660 mm) shall be provided where the floor or footboard elevation is more than 30 inches (762 mm) above the floor or grade below and the fascia or railing would otherwise interfere with the sightlines of immediately adjacent seating.

1029.17.4 Guards at the end of aisles. A fascia or railing system complying with the *guard* requirements of Section 1015 shall be provided for the full width of the *aisle* where the foot of the *aisle* is more than 30 inches (762 mm) above the floor or grade below. The fascia or railing shall be not less than 36 inches (914 mm) high and shall provide not less than 42 inches (1067 mm) measured diagonally between the top of the rail and the *nosing* of the nearest tread.

SECTION 1030
EMERGENCY ESCAPE AND RESCUE

[S] 1030.1 General. In addition to the *means of egress* required by this chapter, *emergency escape and rescue openings* shall be provided in the following occupancies:

1. Group R-2 occupancies located in stories with only one *exit* or *access to* only one *exit* as permitted by Tables 1006.3.3(1) and 1006.3.3(2).
2. Buildings designed with a single exit according to Section 1006.3.3, exception 7.

((~~2~~)) 3. Group R-3 and R-4 occupancies.

1030.1.1 Where required. ((~~*Basements*~~)) Where required by Section 1030.1, *basements* and sleeping rooms below the fourth story above *grade plane* shall have not fewer than one exterior *emergency escape and rescue opening* in accordance with this section. Where *basements* contain one or more sleeping rooms, *emergency escape and rescue openings* shall be required in each sleeping room, but shall not be required in adjoining areas of the *basement*. Such openings shall open directly into a *public way* or to a *yard* or *court* that opens to a *public way*.

Exceptions:

1. *Basements* with a ceiling height of less than 80 inches (2032 mm) shall not be required to have *emergency escape and rescue openings*.
2. *Emergency escape and rescue openings* are not required from *basements* or sleeping rooms that have an *exit* door or *exit access* door that opens directly into a *public way* or to a *yard*, *court* or exterior exit balcony that opens to a *public way*.
3. *Basements* without *habitable spaces* and having not more than 200 square feet (18.6 m^2) in floor area shall not be required to have *emergency escape and rescue openings*.
4. Within individual *dwelling* and *sleeping units* in Groups R-2 and R-3, where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1, 903.3.1.2 or 903.3.1.3, *sleeping rooms* in basements shall not be required to have *emergency escape and rescue openings* provided that the basement has one of the following:

4.1. One *means of egress* and one *emergency escape and rescue opening.*

4.2. Two *means of egress.*

((~~1030.1.1~~)) 1030.1.2 Operational constraints and opening control devices. *Emergency escape and rescue openings* shall be operational from inside the room without the use of keys or tools. Window-opening control devices complying with ASTM F2090 shall be permitted for use on windows serving as a required *emergency escape and rescue opening.*

1030.2 Minimum size. *Emergency escape and rescue openings* shall have a minimum net clear opening of 5.7 square feet (0.53 m^2).

Exception: The minimum net clear opening for *grade-floor emergency escape and rescue openings* shall be 5 square feet (0.46 m^2).

1030.2.1 Minimum dimensions. The minimum net clear opening height dimension shall be 24 inches (610 mm). The minimum net clear opening width dimension shall be 20 inches (508 mm). The net clear opening dimensions shall be the result of normal operation of the opening.

1030.3 Maximum height from floor. *Emergency escape and rescue openings* shall have the bottom of the clear opening not greater than 44 inches (1118 mm) measured from the floor.

1030.4 Window wells. An *emergency escape and rescue opening* with a finished sill height below the adjacent ground level shall be provided with a window well in accordance with Sections 1030.4.1 and 1030.4.2.

1030.4.1 Minimum size. The minimum horizontal area of the window well shall be 9 square feet (0.84 m^2), with a minimum dimension of 36 inches (914 mm). The area of the window well shall allow the *emergency escape and rescue opening* to be fully opened.

1030.4.2 Ladders or steps. Window wells with a vertical depth of more than 44 inches (1118 mm) shall be equipped with an *approved* permanently affixed ladder or steps. Ladders or rungs shall have an inside width of not less than 12 inches (305 mm), shall project not less than 3 inches (76 mm) from the wall and shall be spaced not more than 18 inches (457 mm) on center (o.c.) vertically for the full height of the window well. The ladder or steps shall not encroach into the required dimensions of the window well by more than 6 inches (152 mm). The ladder or steps shall not be obstructed by the *emergency escape and rescue opening.* Ladders or steps required by this section are exempt from the *stairway* requirements of Section 1011.

1030.5 Bars, grilles, covers and screens. Bars, grilles, covers, screens or similar devices are permitted to be placed over *emergency escape and rescue openings*, bulkhead enclosures or window wells that serve such openings, provided that the minimum net clear opening size complies with Sections 1030.1.1 through 1030.4.2 and such devices shall be releasable or removable from the inside without the use of a key, tool or force greater than that which is required for normal operation of the *emergency escape and rescue opening*. Where such bars, grilles, covers, screens or similar devices are installed in existing buildings, they shall not reduce the net clear opening of the *emergency escape and rescue opening* and *smoke alarms* shall be installed in accordance with Section 907.2.10 regardless of the valuation of the *alteration*.

[W] 1030.6 Drainage. Window wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section 1805.4.2 or by an approved alternative method.

CHAPTER 11

ACCESSIBILITY

Note: The City of Seattle does not have authority to enforce or interpret the Americans with Disabilities Act (ADA), ADA Accessibility Guidelines (ADAAG), Fair Housing Act and other state and federal accessibility laws. Approval of a building by SDCI cannot guarantee compliance with those regulations.

User note:

About this chapter: *Chapter 11 contains provisions that set forth requirements for accessibility of buildings and their associated sites and facilities for people with physical disabilities. The fundamental philosophy of the code on the subject of accessibility is that everything is required to be accessible. This is reflected in the basic applicability requirement (see Section 1103.1). The code's scoping requirements then address the conditions under which accessibility is not required in terms of exceptions to this general mandate. While the IBC contains scoping provisions for accessibility (for example, what, where and how many), ICC A117.1, Accessible and Usable Buildings and Facilities, is the referenced standard for the technical provisions (in other words, how). Accessibility criteria for existing buildings are addressed in the* International Existing Building Code®. *The* International Residential Code® *references Chapter 11 for accessibility provisions; therefore, this chapter may be applicable to housing covered under the* International Residential Code. *The provisions in the I-Codes are intended to meet or exceed the requirements in the federal accessibility requirement found in the Americans with Disabilities Act and the Fair Housing Act.*

There are many accessibility issues that not only benefit people with disabilities, but also provide a tangible benefit to people without disabilities. This type of requirement can be set forth in the code as generally applicable without necessarily identifying it specifically as an accessibility-related issue. Such a requirement would then be considered as having been "mainstreamed." For example, visible alarms are located in Chapter 9 and accessible means of egress and ramp requirements are addressed in Chapter 10.

SECTION 1101
GENERAL

[S] 1101.1 Scope. The provisions of this chapter shall control the design and construction of facilities for accessibility. ((~~for individuals with disabilities.~~))

SECTION 1102
COMPLIANCE

[W] 1102.1 Design. Buildings and facilities shall be designed and constructed to be *accessible* in accordance with this code and ICC A117.1, except those portions of ICC A117.1 amended by this section.

1102.1.1 (ICC A117.1 Section 403.5) Clear width of accessible route. Clear width of an *accessible route* shall comply with ICC A117.1 Section 403.5. For exterior routes of travel, the minimum clear width is 44 inches (1118 mm).

1102.1.2 (ICC A117.1 Section 404.2.8) Door-opening force. Fire doors shall have the minimum opening force allowed by the *building official*. The force for pushing or pulling open doors other than fire doors shall be as follows:

1. Interior hinged door: 5.0 pounds (22.2 N) maximum.
2. Interior sliding or folding doors: 5.0 pounds (22.2 N) maximum.
3. Exterior hinged, sliding or folding door: 10 pounds (44.5 N) maximum.

Exception: Interior or exterior automatic doors complying with ICC A117.1 Section 404.

These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position.

1102.1.3 (ICC A117.1 Section 407.4.6.2.2) Arrangement of elevator car buttons. Elevator car buttons shall be arranged with numbers in ascending order. When two or more columns of buttons are provided they shall read from left to right.

1102.1.4 (ICC A117.1 606.7) Operable parts. Operable parts on drying equipment, towel or cleansing product dispensers, and disposal fixtures shall comply with ICC A117.1 Table 603.6.

1102.1.5 (ICC A117.1 Section 604.6) Flush controls. Flush controls shall be hand operated or automatic. Hand operated flush controls shall comply with ICC A117.1 Section 309, except the maximum height above the floor shall be 44 inches (1118 mm). Flush controls shall be located on the open side of the water closet.

Exception: In ambulatory accessible compartments complying with ICC A117.1 Section 604.10, flush controls are permitted to be located on either side of the water closet.

1102.1.6 (ICC A117.1 Section 703.6.3.1) International Symbol of Accessibility. Where the International Symbol of Accessibility is required, it shall be proportioned complying with ICC A117.1 Figure 703.6.3.1. All interior and exterior signs depicting the International Symbol of Accessibility shall be white on a blue background.

[W] 1102.1.7 (ICC A117.1 Section 502.2) Vehicle space size. Car and van parking spaces shall be 96 inches (2440 mm) minimum in width.

1102.1.8 (ICC A117.1 Section 502.4.2) Access aisle width. Access aisles serving car parking spaces shall be 60 inches (1525 mm) minimum in width. Access aisles serving van parking spaces shall be 96 inches (2440 mm) minimum in width.

1102.1.9 (ICC A117.1 Section 502.7) Identification. Accessible parking spaces shall be indicated by a vertical sign. The signs shall include the International Symbol of Accessibility complying with subsection 703.6.3.1. Such symbol shall be white on a blue background. Signs identifying van parking spaces shall contain the designation "van accessible." The sign may include additional language such as, but not limited to, an indication of the amount of the monetary penalty defined in RCW 46.19.050 for parking in the space without a valid permit. A vertical "no parking" sign shall be erected at the head of each access aisle located adjacent to an accessible parking space. The sign may include additional language such as, but not limited to, an indication of any penalty for parking in an access aisle. Such signs shall be 60 inches (1525 mm) minimum above the floor of the parking space, measured to the bottom of the sign.

SECTION 1103
SCOPING REQUIREMENTS

1103.1 Where required. *Sites*, buildings, *structures*, *facilities*, elements and spaces, temporary or permanent, shall be *accessible* to individuals with disabilities.

1103.2 General exceptions. *Sites*, buildings, *structures*, *facilities*, elements and spaces shall be exempt from this chapter to the extent specified in this section.

1103.2.1 Specific requirements. *Accessibility* is not required in buildings and *facilities*, or portions thereof, to the extent permitted by Sections 1104 through 1111.

1103.2.2 Employee work areas. Spaces and elements within *employee work areas* shall only be required to comply with Sections 907.5.2.3.1, 1009 and 1104.3.1 and shall be designed and constructed so that individuals with disabilities can approach, enter and exit the work area. Work areas, or portions of work areas, other than raised courtroom stations in accordance with Section 1108.4.1.4, that are less than 300 square feet (30 m^2) in area and located 7 inches (178 mm) or more above or below the ground or finished floor where the change in elevation is essential to the function of the space shall be exempt from all requirements.

1103.2.3 Detached dwellings. Detached one- and two- family *dwellings*, their accessory structures and their associated *sites* and *facilities* are not required to comply with this chapter.

1103.2.4 Utility buildings. Group U occupancies are not required to comply with this chapter other than the following:

1. In agricultural buildings, access is required to paved work areas and areas open to the general public.
2. Private garages or carports that contain required *accessible* parking.

1103.2.5 Construction sites. Structures, *sites* and equipment directly associated with the actual processes of construction including, but not limited to, scaffolding, bridging, materials hoists, materials storage or construction trailers are not required to comply with this chapter.

1103.2.6 Raised areas. Raised areas used primarily for purposes of security, life safety or fire safety including, but not limited to, observation galleries, prison guard towers, fire towers or lifeguard stands are not required to comply with this chapter.

1103.2.7 Limited access spaces. Spaces accessed only by ladders, catwalks, crawl spaces, freight elevators or very narrow passageways are not required to comply with this chapter.

1103.2.8 Areas in places of religious worship. Raised or lowered areas, or portions of areas, in *places of religious worship* that are less than 300 square feet (30 m^2) in area and located 7 inches (178 mm) or more above or below the finished floor and used primarily for the performance of religious ceremonies are not required to comply with this chapter.

1103.2.9 Equipment spaces. Spaces frequented only by service personnel for maintenance, repair or occasional monitoring of equipment are not required to comply with this chapter.

1103.2.10 Highway tollbooths. Highway tollbooths where the access is provided only by bridges above the vehicular traffic or underground tunnels are not required to comply with this chapter.

1104.4 Multistory buildings and facilities. At least one *accessible route* shall connect each *accessible story*, *mezzanine* and occupied roofs in multilevel buildings and *facilities*.

Exceptions:

1. An *accessible route* is not required to *stories*, *mezzanines* and occupied roofs that have an aggregate area of not more than 3,000 square feet (278.7 m^2) and are located above and below *accessible* levels. This exception shall not apply to:
   - 1.1. Multiple tenant facilities of Group M occupancies containing five or more tenant spaces used for the sales or rental of goods and where at least one such tenant space is located on a floor level above or below the *accessible* levels.
   - 1.2. *Stories* or *mezzanines* containing offices of health care providers (Group B or I).
   - 1.3. Passenger transportation facilities and airports (Group A-3 or B).
   - 1.4. Government buildings.
2. *Stories*, *mezzanines* or occupied roofs that do not contain *accessible* elements or other spaces as determined by Section 1107 or 1108 are not required to be served by an *accessible route* from an *accessible* level.
3. In air traffic control towers, an *accessible route* is not required to serve the cab and the floor immediately below the cab.
4. Where a two-story building or facility has one *story* or *mezzanine* with an *occupant load* of five or fewer persons that does not contain *public use* space, that *story* or *mezzanine* shall not be required to be connected by an *accessible route* to the *story* above or below.

1104.5 Location. *Accessible routes* shall coincide with or be located in the same area as a general *circulation path*. Where the *circulation path* is interior, the *accessible route* shall be interior. Where only one *accessible route* is provided, the *accessible route* shall not pass through kitchens, storage rooms, restrooms, closets or similar spaces.

Exceptions:

1. *Accessible routes* from parking garages contained within and serving *Type B units* are not required to be interior.
2. A single *accessible route* is permitted to pass through a kitchen or storage room in an *Accessible unit*, *Type A unit* or *Type B unit*.

1104.6 Security barriers. Security barriers including, but not limited to, security bollards and security check points shall not obstruct a required *accessible route* or accessible *means of egress*.

Exception: Where security barriers incorporate elements that cannot comply with these requirements, such as certain metal detectors, fluoroscopes or other similar devices, the *accessible route* shall be permitted to be provided adjacent to security screening devices. The *accessible route* shall permit persons with disabilities passing around security barriers to maintain visual contact with their personal items to the same extent provided others passing through the security barrier.

[S] 1104.7 Raised platforms. In banquet rooms or spaces where a head table or speaker's lectern is located on a raised platform, an *accessible route* shall be provided to the platform.

SECTION 1105
ACCESSIBLE ENTRANCES

1105.1 Public entrances. In addition to *accessible* entrances required by Sections 1105.1.1 through 1105.1.7, at least 60 percent of all *public entrance*s shall be *accessible*.

Exceptions:

1. An *accessible* entrance is not required to areas not required to be *accessible*.
2. Loading and *service entrances* that are not the only entrance to a tenant space.

1105.1.1 Parking garage entrances. Where provided, direct access for pedestrians from parking structures to buildings or facility entrances shall be *accessible*.

1105.1.2 Entrances from tunnels or elevated walkways. Where direct access is provided for pedestrians from a pedestrian tunnel or elevated walkway to a building or facility, at least one entrance to the building or facility from each tunnel or walkway shall be *accessible*.

1105.1.3 Restricted entrances. Where *restricted entrances* are provided to a building or facility, at least one *restricted entrance* to the building or facility shall be *accessible*.

1105.1.4 Entrances for inmates or detainees. Where entrances used only by inmates or detainees and security personnel are provided at judicial facilities, detention facilities or correctional facilities, at least one such entrance shall be *accessible*.

1105.1.5 Service entrances. If a *service entrance* is the only entrance to a building or a tenant space in a facility, that entrance shall be *accessible*.

1105.1.6 Tenant spaces. At least one *accessible* entrance shall be provided to each tenant in a facility.

Exception: An *accessible* entrance is not required to self-service storage facilities that are not required to be *accessible.*

1105.1.7 Dwelling units and sleeping units. At least one *accessible* entrance shall be provided to each *dwelling unit* and *sleeping unit* in a facility.

Exception: An *accessible* entrance is not required to *dwelling units* and *sleeping units* that are not required to be *Accessible units*, *Type A units* or *Type B units*.

[W] 1105.1.8 Automatic doors. In facilities with the occupancies and building occupant loads indicated in Table 1105.1.8, all public entrances that are required to be accessible shall have one door be either a full power-operated door or a low-energy power-operated door. Where the public entrance includes a vestibule, at least one door into and one door out of the vestibule shall meet the requirements of this section.

[W] TABLE 1105.1.8[a]
PUBLIC ENTRANCE WITH POWER-OPERATED DOOR

OCCUPANCY	BUILDING OCCUPANT LOAD GREATER THAN
A-1, A-2, A-3, A-4	300
B, M, R-1	500

a. In mixed-use facilities containing occupancies listed, when the total sum of the occupant load is greater than those listed, the most restrictive building occupant load shall apply.

SECTION 1106
PARKING AND PASSENGER LOADING FACILITIES

1106.1 Required. Where parking is provided, *accessible* parking spaces shall be provided in compliance with Table 1106.1, except as required by Sections 1106.2 through 1106.4. Where more than one parking facility is provided on a *site*, the number of parking spaces required to be *accessible* shall be calculated separately for each parking facility.

Exception: This section does not apply to parking spaces used exclusively for buses, trucks, other delivery vehicles, law enforcement vehicles or vehicular impound and motor pools where lots accessed by the public are provided with an *accessible* passenger loading zone.

TABLE 1106.1
ACCESSIBLE PARKING SPACES

TOTAL PARKING SPACES PROVIDED IN PARKING FACILITIES	REQUIRED MINIMUM NUMBER OF ACCESSIBLE SPACES
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 to 1,000	2% of total
1,001 and over	20, plus one for each 100, or fraction thereof, over 1,000

[S] 1106.2 Groups I-1, R-1, R-2, and R-3. ((~~and R-4.~~)) *Accessible* parking spaces shall be provided in Group I-1, R-1, R-2, and R-3 ((~~and R-4~~)) occupancies in accordance with Items 1 through 4 as applicable.

1. In Group R-2 ((~~,~~)) and R-3 ((~~and R-4~~)) occupancies that are required to have *Accessible*, *Type A* or *Type B dwelling units* or *sleeping units*, at least 2 percent, but not less than one, of each type of parking space provided shall be *accessible*.
2. In Group I-1 and R-1 occupancies, *accessible* parking shall be provided in accordance with Table 1106.1.

3. Where at least one parking space is provided for each *dwelling unit* or *sleeping unit*, at least one *accessible* parking space shall be provided for each *Accessible* and *Type A unit*.
4. Where parking is provided within or beneath a building, *accessible* parking spaces shall be provided within or beneath the building.

1106.3 Hospital outpatient facilities. At least 10 percent, but not less than one, of care recipient and visitor parking spaces provided to serve hospital outpatient facilities shall be *accessible*.

1106.4 Rehabilitation facilities and outpatient physical therapy facilities. At least 20 percent, but not less than one, of the portion of care recipient and visitor parking spaces serving rehabilitation facilities specializing in treating conditions that affect mobility and outpatient physical therapy facilities shall be *accessible*.

1106.5 Van spaces. For every six or fraction of six *accessible* parking spaces, at least one shall be a van-accessible parking space.

Exception: In Group U *private garages* that serve Group R-2 and R-3 occupancies, van-accessible spaces shall be permitted to have vehicular routes, entrances, parking spaces and access aisles with a minimum vertical clearance of 7 feet (2134 mm).

[W] 1106.6 Location. *Accessible* parking spaces shall be located on the shortest *accessible route* of travel from adjacent parking to an *accessible* building entrance. In parking facilities that do not serve a particular building, *accessible* parking spaces shall be located on the shortest route to an *accessible* pedestrian entrance to the parking facility. Where buildings have multiple *accessible* entrances with adjacent parking, *accessible* parking spaces shall be dispersed and located near the *accessible* entrances. Wherever practical, the *accessible route* shall not cross lanes of vehicular traffic. Where crossing traffic lanes is necessary, the route shall be designated and marked as a crosswalk.

Exceptions:

1. In multilevel parking structures, van-accessible parking spaces are permitted on one level.
2. *Accessible* parking spaces shall be permitted to be located in different parking facilities if substantially equivalent or greater accessibility is provided in terms of distance from an *accessible* entrance or entrances, parking fee and user convenience.

1106.7 Passenger loading zones. Passenger loading zones shall be *accessible*.

1106.7.1 Continuous loading zones. Where passenger loading zones are provided, one passenger loading zone in every continuous 100 linear feet (30.4 m) maximum of loading zone space shall be *accessible*.

1106.7.2 Medical facilities. A passenger loading zone shall be provided at an *accessible* entrance to licensed medical and long-term care facilities where people receive physical or medical treatment or care and where the period of stay exceeds 24 hours.

1106.7.3 Valet parking. A passenger loading zone shall be provided at valet parking services.

1106.7.4 Mechanical access parking garages. Mechanical access parking garages shall provide at least one passenger loading zone at vehicle drop-off and vehicle pick-up areas.

[S] SECTION 1107
DWELLING UNITS, ((~~AND~~)) SLEEPING UNITS AND TRANSIENT LODGING FACILITIES

1107.1 General. In addition to the other requirements of this chapter, occupancies having *dwelling units* or *sleeping units* shall be provided with *accessible* features in accordance with this section.

1107.2 Design. *Dwelling units* and *sleeping units* that are required to be *Accessible units*, *Type A units* and *Type B units* shall comply with the applicable portions of Chapter 10 of ICC A117.1. Units required to be *Type A units* are permitted to be designed and constructed as *Accessible units*. Units required to be *Type B units* are permitted to be designed and constructed as *Accessible units* or as *Type A units*.

1107.3 Accessible spaces. Rooms and spaces available to the general public or available for use by residents and serving *Accessible units*, *Type A units* or *Type B units* shall be *accessible*. *Accessible* spaces shall include toilet and bathing rooms, kitchen, living and dining areas and any exterior spaces, including patios, terraces and balconies.

Exceptions:

1. *Stories* and *mezzanines* exempted by Section 1107.4.
2. Recreational facilities in accordance with Section 1110.2.
3. Exterior decks, patios or balconies that are part of *Type B units* and have impervious surfaces, and that are not more than 4 inches (102 mm) below the finished floor level of the adjacent interior space of the unit.

1107.4 Accessible route. Not fewer than one *accessible route* shall connect *accessible* building or facility entrances with the primary entrance of each *Accessible unit*, *Type A unit* and *Type B unit* within the building or facility and with those exterior and interior spaces and facilities that serve the units.

Exceptions:

1. If due to circumstances outside the control of the owner, either the slope of the finished ground level between *accessible* facilities and buildings exceeds one unit vertical in 12 units horizontal (1:12), or where physical barriers or legal restrictions prevent the installation of an *accessible route*, a vehicular route with parking that complies with Section 1106 at each *public* or *common use* facility or building is permitted in place of the *accessible route*.
2. In Group I-3 facilities, an *accessible route* is not required to connect *stories* or *mezzanines* where *Accessible units*, all *common use* areas serving *Accessible units* and all *public use* areas are on an *accessible* route.
3. In Group R-2 facilities with *Type A units* complying with Section 1107.6.2.2.1, an *accessible route* is not required to connect *stories* or *mezzanines* where *Type A units*, all *common use* areas serving *Type A units* and all public use areas are on an *accessible route*.
4. In other than Group R-2 dormitory housing provided by places of education, in Group R-2 facilities with *Accessible units* complying with Section 1107.6.2.3.1, an *accessible route* is not required to connect *stories* or *mezzanines* where *Accessible units*, all *common use* areas serving *Accessible units* and all *public use* areas are on an *accessible* route.
5. In Group R-1, an *accessible route* is not required to connect *stories* or *mezzanines* within individual units, provided the *accessible* level meets the provisions for *Accessible units* and sleeping accommodations for two persons minimum and a toilet facility are provided on that level.
6. In congregate residences in ((~~Groups R-3 and R-4~~)) Group R-3, an *accessible route* is not required to connect *stories* or *mezzanines* where *Accessible units* or *Type B units*, all *common use* areas serving *Accessible units* and *Type B units* and all *public use* areas serving *Accessible units* and *Type B units* are on an *accessible route*.
7. An *accessible route* between *stories* is not required where *Type B units* are exempted by Section 1107.7.

[W] 1107.5 Group I. *Accessible units* and *Type B units* shall be provided in Group I occupancies in accordance with Sections 1107.5.1 through 1107.5.5.

1107.5.1 Group I-1. *Accessible units* and *Type B units* shall be provided in Group I-1 occupancies in accordance with Sections 1107.5.1.1 and ((~~1107.5.1.2~~)) 1107.5.1.3.

[W] 1107.5.1.1 Accessible units in Group I-1, Condition 1. In Group I-1, Condition 1, at least 4 percent, but not less than one, of the *dwelling units* and *sleeping units* shall be *Accessible units*.

Exceptions:

1. In not more than 50 percent of the accessible units, water closets shall not be required to comply with ICC A117.1 where such water closets comply with Section 1109.2.2.
2. In not more than 50 percent of the accessible units, roll-in-type showers shall not be required to comply with ICC A117.1 where roll in- type showers comply with Section 1109.2.3.

[W] 1107.5.1.2 Accessible units in Group I-1, Condition 2. In Group I-1, Condition 2, at least 10 percent, but not less than one, of the *dwelling units* and *sleeping units* shall be *Accessible units*.

Exceptions:

1. In not more than 50 percent of the accessible units, water closets shall not be required to comply with ICC A117.1 where such water closets comply with Section 1109.2.2.
2. In not more than 50 percent of the accessible units, roll-in-type showers shall not be required to comply with ICC A117.1 where roll-in-type showers comply with Section 1109.2.3.

((~~1107.5.1.2~~)) 1107.5.1.3 Type B units. In structures with four or more *dwelling units* or *sleeping units intended to be occupied as a residence*, every *dwelling unit* and *sleeping unit intended to be occupied as a residence* shall be a *Type B unit*.

Exception: The number of *Type B units* is permitted to be reduced in accordance with Section 1107.7.

[W] 1107.5.2 Group I-2 nursing homes. *Accessible units* and *Type B units* shall be provided in nursing homes of Group I-2 occupancies in accordance with Sections 1107.5.2.1 and 1107.5.2.2.

1107.5.2.1 Accessible units. At least 50 percent but not less than one of each type of the *dwelling units* and *sleeping units* shall be *Accessible units*.

Exceptions:

1. In not more than 90 percent of the accessible units, water closets shall not be required to comply with ICC A117.1 where such water closets comply with Section 1109.2.2.

2. In not more than 90 percent of the accessible units, roll-in-type showers shall not be required to comply with ICC A117.1 where roll-in-type showers comply with Section 1109.2.3.

1107.5.2.2 Type B units. In structures with four or more *dwelling units* or *sleeping units intended to be occupied as a residence*, every *dwelling unit* and *sleeping unit intended to be occupied as a residence* shall be a *Type B unit*.

Exception: The number of *Type B units* is permitted to be reduced in accordance with Section 1107.7.

1107.5.3 Group I-2 hospitals. *Accessible units* and *Type B units* shall be provided in general-purpose hospitals, psychiatric facilities and detoxification facilities of Group I-2 occupancies in accordance with Sections 1107.5.3.1 and 1107.5.3.2.

1107.5.3.1 Accessible units. At least 10 percent, but not less than one, of the *dwelling units* and *sleeping units* shall be *Accessible units*.

Exception: Entry doors to *Accessible dwelling units* or *sleeping units* shall not be required to provide the maneuvering clearance beyond the latch side of the door.

1107.5.3.2 Type B units. In structures with four or more *dwelling units* or *sleeping units intended to be occupied as a residence*, every *dwelling unit* and *sleeping unit intended to be occupied as a residence* shall be a *Type B unit*.

Exception: The number of *Type B units* is permitted to be reduced in accordance with Section 1107.7.

[W] 1107.5.4 Group I-2 rehabilitation facilities. In hospitals and rehabilitation facilities of Group I-2 occupancies that specialize in treating conditions that affect mobility, or units within either that specialize in treating conditions that affect mobility, 100 percent of the *dwelling units* and *sleeping units* shall be *Accessible units*.

Exceptions:

1. In not more than 50 percent of the accessible units, water closets shall not be required to comply with ICC A117.1 where such water closets comply with Section 1109.2.2.
2. In not more than 50 percent of the accessible units, roll-in-type showers shall not be required to comply with ICC A117.1 where roll-in-type showers comply with Section 1109.2.3.

1107.5.5 Group I-3. *Accessible units* shall be provided in Group I-3 occupancies in accordance with Sections 1107.5.5.1 through 1107.5.5.3.

1107.5.5.1 Group I-3 sleeping units. In Group I-3 occupancies, at least 3 percent of the total number of *sleeping units* in the facility, but not less than one unit in each classification level, shall be *Accessible units*.

1107.5.5.2 Special holding cells and special housing cells or rooms. In addition to the *Accessible units* required by Section 1107.5.5.1, where special holding cells or special housing cells or rooms are provided, at least one serving each purpose shall be an *Accessible unit*. Cells or rooms subject to this requirement include, but are not limited to, those used for purposes of orientation, protective custody, administrative or disciplinary detention or segregation, detoxification and medical isolation.

Exception: Cells or rooms specially designed without protrusions and that are used solely for purposes of suicide prevention shall not be required to include grab bars.

1107.5.5.3 Medical care facilities. Patient *sleeping units* or cells required to be *Accessible units* in medical care facilities shall be provided in addition to any medical isolation cells required to comply with Section 1107.5.5.2.

1107.6 Group R. *Accessible units*, *Type A units* and *Type B units* shall be provided in Group R occupancies in accordance with Sections 1107.6.1 through 1107.6.4.

Interpretation I1107.6: Accessible and Type A units shall be apportioned among efficiency dwelling units, single bedroom units and multiple bedroom units, in proportion to the numbers of such units in the building.

1107.6.1 Group R-1. *Accessible units* and *Type B units* shall be provided in Group R-1 occupancies in accordance with Sections 1107.6.1.1 and 1107.6.1.2.

1107.6.1.1 Accessible units. *Accessible dwelling units* and *sleeping units* shall be provided in accordance with Table 1107.6.1.1. On a multiple-building site, where structures contain more than 50 *dwelling units* or *sleeping units*, the number of *Accessible units* shall be determined per structure. On a multiple-building site, where structures contain 50 or fewer *dwelling units* or *sleeping units*, all *dwelling units* and *sleeping units* on a *site* shall be considered to determine the total number of *Accessible units*. *Accessible units* shall be dispersed among the various classes of units.

TABLE 1107.6.1.1
ACCESSIBLE DWELLING UNITS AND SLEEPING UNITS

TOTAL NUMBER OF UNITS PROVIDED	MINIMUM REQUIRED NUMBER OF ACCESSIBLE UNITS WITHOUT ROLL-IN SHOWERS	MINIMUM REQUIRED NUMBER OF ACCESSIBLE UNITS WITH ROLL-IN SHOWERS	TOTAL NUMBER OF REQUIRED ACCESSIBLE UNITS
1 to 25	1	0	1
26 to 50	2	0	2
51 to 75	3	1	4
76 to 100	4	1	5
101 to 150	5	2	7
151 to 200	6	2	8
201 to 300	7	3	10
301 to 400	8	4	12
401 to 500	9	4	13
501 to 1,000	2% of total	1% of total	3% of total
Over 1,000	20, plus 1 for each 100, or fraction thereof, over 1,000	10 plus 1 for each 100, or fraction thereof, over 1,000	30 plus 2 for each 100, or fraction thereof, over 1,000

1107.6.1.2 Type B units. In structures with four or more *dwelling units* or *sleeping units intended to be occupied as a residence*, every *dwelling unit* and *sleeping unit intended to be occupied as a residence* shall be a *Type B unit*.

Exception: The number of *Type B units* is permitted to be reduced in accordance with Section 1107.7.

1107.6.2 Group R-2. *Accessible units*, *Type A units* and *Type B units* shall be provided in Group R-2 occupancies in accordance with Sections 1107.6.2.1 through 1107.6.2.3.

1107.6.2.1 Live/work units. In *live/work units* constructed in accordance with Section 419, the nonresidential portion is required to be *accessible*. In a structure where there are four or more *live/work units intended to be occupied as a residence*, the residential portion of the *live/work unit* shall be a *Type B unit.*

Exception: The number of *Type B units* is permitted to be reduced in accordance with Section 1107.7.

1107.6.2.2 Apartment houses, monasteries and convents. *Type A units* and *Type B units* shall be provided in apartment houses, monasteries and convents in accordance with Sections 1107.6.2.2.1 and 1107.6.2.2.2. Bedrooms in monasteries and convents shall be counted as units for the purpose of determining the number of units. Where the bedrooms are grouped in *sleeping units*, only one bedroom in each *sleeping unit* shall count toward the number of required Type A units.

[W] 1107.6.2.2.1 Type A units. In Group R-2 occupancies containing more than ((~~20~~)) 10 *dwelling units* or *sleeping units*, at least ((~~2~~)) 5 percent, but not less than one, of the units shall be a *Type A unit.* All ((~~Group R-2~~)) units on a *site* shall be considered to determine the total number of units and the required number of *Type A units. Type A units* shall be dispersed among the various classes of units, as described in Section 1107.6.

Exceptions:

1. The number of *Type A units* is permitted to be reduced in accordance with Section 1107.7.
2. *Existing structures* on a *site* shall not contribute to the total number of units on a *site*.

1107.6.2.2.2 Type B units. Where there are four or more *dwelling units* or *sleeping units intended to be occupied as a residence* in a single structure, every *dwelling unit* and *sleeping unit intended to be occupied as a residence* shall be a *Type B unit*.

Exception: The number of *Type B units* is permitted to be reduced in accordance with Section 1107.7.

[W] 1107.6.2.3 Group R-2 other than live/work units, apartment houses, monasteries and convents. In Group R-2 occupancies, other than *live/work units*, apartment houses, monasteries and convents falling within the scope of Sections 1107.6.2.1 and 1107.6.2.2, *Accessible units* and *Type B units* shall be provided in accordance with Sections 1107.6.2.3.1 and 1107.6.2.3.2. Bedrooms within congregate living facilities, dormitories, sororities, fraternities and boarding houses shall be counted as *sleeping units* for the purpose of determining the number of units. Where the *bedrooms* are grouped into *dwelling* or *sleeping units*, only one *bedroom* in each *dwelling* or *sleeping unit* shall be permitted to count toward the number of required *Accessible units*. *Accessible units* shall be dispersed among the various classes of units, as described in Section 1107.6.1.1.

1107.6.2.3.1 Accessible units. *Accessible dwelling units* and *sleeping units* shall be provided in accordance with Table 1107.6.1.1.

1107.6.2.3.2 Type B units. Where there are four or more *dwelling units* or *sleeping units intended to be occupied as a residence* in a single structure, every *dwelling unit* and every *sleeping unit intended to be occupied as a residence* shall be a *Type B unit*.

Exception: The number of *Type B units* is permitted to be reduced in accordance with Section 1107.7.

1107.6.3 Group R-3. In Group R-3 occupancies where there are four or more *dwelling units* or *sleeping units intended to be occupied as a residence* in a single structure, every *dwelling unit* and *sleeping unit intended to be occupied as a residence* shall be a *Type B unit*. Bedrooms within congregate living facilities, dormitories, sororities, fraternities, and boarding houses shall be counted as *sleeping units* for the purpose of determining the number of units.

Exception: The number of *Type B units* is permitted to be reduced in accordance with Section 1107.7.

[S] ((~~1107.6.4 Group R-4.~~ ~~*Accessible units* and *Type B units* shall be provided in Group R-4 occupancies in accordance with Sections 1107.6.4.1 and 1107.6.4.2. Bedrooms in Group R-4 facilities shall be counted as *sleeping units* for the purpose of determining the number of units.~~

~~**1107.6.4.1 Accessible units.** In Group R-4, Condition 1, at least one of the *sleeping units* shall be an *Accessible unit*. In Group R-4, Condition 2, at least two of the *sleeping units* shall be an *Accessible unit*.~~

~~**1107.6.4.2 Type B units.** In structures with four or more *sleeping units intended to be occupied as a residence*, every *sleeping unit intended to be occupied as a residence* shall be a *Type B unit*.~~

~~**Exception:** The number of *Type B units* is permitted to be reduced in accordance with Section 1107.7.~~))

1107.7 General exceptions. Where specifically permitted by Section 1107.5 or 1107.6, the required number of *Type A units* and *Type B units* is permitted to be reduced in accordance with Sections 1107.7.1 through 1107.7.5.

1107.7.1 Structures without elevator service. Where elevator service is not provided in a structure, only the *dwelling units* and *sleeping units* that are located on stories indicated in Sections 1107.7.1.1 and 1107.7.1.2 are required to be *Type A units* and *Type B units*, respectively. The number of *Type A units* shall be determined in accordance with Section 1107.6.2.2.1.

1107.7.1.1 One story with Type B units required. At least one *story* containing *dwelling units* or *sleeping units intended to be occupied as a residence* shall be provided with an *accessible* entrance from the exterior of the structure and all units *intended to be occupied as a residence* on that *story* shall be *Type B units*.

1107.7.1.2 Additional stories with Type B units. Where stories have entrances not included in determining compliance with Section 1107.7.1.1, and such entrances are proximate to arrival points intended to serve units on that *story*, as indicated in Items 1 and 2, all *dwelling units* and *sleeping units intended to be occupied as a residence* served by that entrance on that *story* shall be *Type B units*.

1. Where the slopes of the undisturbed *site* measured between the planned entrance and all vehicular or pedestrian arrival points within 50 feet (15 240 mm) of the planned entrance are 10 percent or less.
2. Where the slopes of the planned finished grade measured between the entrance and all vehicular or pedestrian arrival points within 50 feet (15 240 mm) of the planned entrance are 10 percent or less.

Where arrival points are not within 50 feet (15 240 mm) of the entrance, the closest arrival point shall be used to determine access unless that arrival point serves the *story* required by Section 1107.7.1.1.

1107.7.2 Multistory units. A *multistory dwelling unit* or *sleeping unit* that is not provided with elevator service is not required to be a *Type B unit*. Where a *multistory unit* is provided with external elevator service to only one floor, the floor provided with elevator service shall be the primary entry to the unit, shall comply with the requirements for a *Type B unit* and, where provided within the unit, a living area, a kitchen and a toilet facility shall be provided on that floor.

1107.7.3 Elevator service to the lowest story with units. Where elevator service in the building provides an *accessible route* only to the lowest *story* containing *dwelling units* or *sleeping units intended to be occupied as a residence*, only the units on that *story* that are *intended to be occupied as a residence* are required to be *Type B units*.

1107.7.4 Site impracticality. On a *site* with multiple nonelevator buildings, the number of units required by Section 1107.7.1 to be *Type B units* is permitted to be reduced to a percentage that is equal to the percentage of the entire *site* having grades, prior to development, that are less than 10 percent, provided that all of the following conditions are met:

1. Not less than 20 percent of the units required by Section 1107.7.1 on the *site* are *Type B units*.
2. Units required by Section 1107.7.1, where the slope between the building entrance serving the units on that *story* and a pedestrian or vehicular arrival point is not greater than 8.33 percent, are *Type B units*.
3. Units required by Section 1107.7.1, where an elevated walkway is planned between a building entrance serving the units on that *story* and a pedestrian or vehicular arrival point and the slope between them is 10 percent or less, are *Type B units*.
4. Units served by an elevator in accordance with Section 1107.7.3 are *Type B units*.

1107.7.5 Design flood elevation. The required number of *Type A units* and *Type B units* shall not apply to a *site* where the required elevation of the lowest floor or the lowest horizontal structural building members of nonelevator buildings are at or above the *design flood elevation* resulting in all of the following:

1. A difference in elevation between the minimum required floor elevation at the primary entrances and vehicular and pedestrian arrival points within 50 feet (15 240 mm) exceeding 30 inches (762 mm).
2. A slope exceeding 10 percent between the minimum required floor elevation at the primary entrances and vehicular and pedestrian arrival points within 50 feet (15 240 mm).

Where such arrival points are not within 50 feet (15 240 mm) of the primary entrances, the closest arrival points shall be used.

[W] 1107.8 Communication features. Accessible communication features shall be provided in accordance with Sections 1107.8.1 through 1107.8.4. **

1107.8.1 Transient lodging. In *transient lodging* facilities, sleeping units with accessible communication features shall be provided in accordance with Table 1107.8. Units required to comply with Table 1107.8 shall be dispersed among the various classes of units.

**[W] TABLE 1107.8 **
DWELLING OR SLEEPING UNITS WITH ACCESSIBLE COMMUNICATION FEATURES

TOTAL NUMBER OF DWELLING OR SLEEPING UNITS PROVIDED	MINIMUM REQUIRED NUMBER OF DWELLING OR SLEEPING UNITS WITH ACCESSIBLE COMMUNICATION FEATURES
1	1
2 to 25	2
26 to 50	4
51 to 75	7
76 to 100	9
101 to 150	12
151 to 200	14
201 to 300	17
301 to 400	20
401 to 500	22
501 to 1,000	5% of total
1,001 and over	50 plus 3 for each 100 over 1,000

1107.8.2 Group I-3. In Group I-3 occupancies at least 2 percent, but no fewer than one of the total number of general holding cells and general housing cells equipped with audible emergency alarm systems and permanently installed telephones within the cell, shall comply with Section 1107.8.4.

1107.8.3 Dwelling units and sleeping units. Where *dwelling units* and *sleeping units* are altered or added, the requirements of Section 1107.8 shall apply only to the units being altered or added until the number of units with accessible communication features complies with the minimum number required for new construction.

1107.8.4 Notification devices. Visual notification devices shall be provided to alert room occupants of incoming telephone calls and a door knock or bell. Notification devices shall not be connected to visual alarm signal appliances. Permanently installed telephones shall have volume controls and an electrical outlet complying with ICC 117.1 located within 48 inches (1219 mm) of the telephone to facilitate the use of a TTY.

SECTION 1108
SPECIAL OCCUPANCIES

1108.1 General. In addition to the other requirements of this chapter, the requirements of Sections 1108.2 through 1108.4 shall apply to specific occupancies.

1108.2 Assembly area seating. A building, room or space used for assembly purposes with *fixed seating* shall comply with Sections 1108.2.1 through 1108.2.5. Lawn seating shall comply with Section 1108.2.6. Assistive listening systems shall comply with Section 1108.2.7. Performance areas viewed from assembly seating areas shall comply with Section 1108.2.8. Dining areas shall comply with Section 1108.2.9.

1108.2.1 Services. If a service or facility is provided in an area that is not *accessible*, the same service or facility shall be provided on an *accessible* level and shall be *accessible*.

1108.4.1.2 Gallery seating. *Wheelchair spaces* shall be provided in accordance with Table 1108.2.2.1. Designated aisle seats shall be provided in accordance with Section 1108.2.5.

1108.4.1.3 Assistive listening systems. An assistive listening system must be provided. Receivers shall be provided for the assistive listening system in accordance with Section 1108.2.7.1.

1108.4.1.4 Employee work stations. The judge's bench, clerk's station, bailiff's station, deputy clerk's station and court reporter's station shall be located on an accessible route. The vertical access to elevated employee work stations within a courtroom is not required at the time of initial construction, provided a *ramp*, lift or elevator can be installed without requiring reconfiguration or extension of the courtroom or extension of the electrical system.

1108.4.1.5 Other work stations. The litigant's and counsel stations, including the lectern, shall be *accessible*.

1108.4.2 Holding cells. Central holding cells and court-floor holding cells shall comply with Sections 1108.4.2.1 and 1108.4.2.2.

1108.4.2.1 Central holding cells. Where separate central holding cells are provided for adult males, juvenile males, adult females or juvenile females, one of each type shall be *accessible*. Where central holding cells are provided and are not separated by age or sex, at least one *accessible* cell shall be provided.

1108.4.2.2 Court-floor holding cells. Where separate court-floor holding cells are provided for adult males, juvenile males, adult females or juvenile females, each courtroom shall be served by one *accessible* cell of each type. Where court-floor holding cells are provided and are not separated by age or sex, courtrooms shall be served by at least one *accessible* cell. *Accessible* cells shall be permitted to serve more than one courtroom.

SECTION 1109
OTHER FEATURES AND FACILITIES

1109.1 General. *Accessible* building features and facilities shall be provided in accordance with Sections 1109.2 through 1109.15.

Exception: *Accessible units*, *Type A units* and *Type B units* shall comply with Chapter 10 of ICC A117.1.

[W] 1109.2 Toilet and bathing facilities. Each toilet room and bathing room shall be *accessible*. Where a floor level is not required to be connected by an *accessible route*, the only toilet rooms or bathing rooms provided within the facility shall not be located on the inaccessible floor. Except as provided for in Sections 1109.2.2, ((~~and~~)) 1109.2.3, 1109.2.4, and 1109.2.5 at least one of each type of fixture, element, control or dispenser in each accessible toilet room and bathing room shall be *accessible.*

Exceptions:

1. Toilet rooms or bathing rooms accessed only through a private office, not for *common* or *public use* and intended for use by a single occupant, shall be permitted to comply with the specific exceptions in ICC A117.1.
2. This section is not applicable to toilet and bathing rooms that serve *dwelling units* or *sleeping units* that are not required to be *accessible* by Section 1107.
3. Where multiple single-user toilet rooms or bathing rooms are clustered at a single location, at least 50 percent but not less than one room for each use at each cluster shall be *accessible*. Where these rooms are designated as gender-neutral, the total number of accessible toilet or bathing rooms shall not be less than the sum of required accessible separate male plus female rooms.
4. Where no more than one urinal is provided in a toilet room or bathing room, the urinal is not required to be *accessible*.
5. Toilet rooms or bathing rooms that are part of critical care or intensive care patient sleeping rooms serving *Accessible units* are not required to be *accessible*.
6. Toilet rooms or bathing rooms designed for bariatrics patients are not required to comply with the toilet room and bathing room requirement in ICC A117.1. The *sleeping units* served by bariatrics toilet or bathing rooms shall not count toward the required number of *Accessible sleeping units.*
7. Where permitted in Section 1107, in toilet rooms or bathrooms serving accessible units, water closets designed for assisted toileting shall comply with Section 1109.2.2.
8. Where permitted in Section 1107, in bathrooms serving accessible units, showers designed for assisted bathing shall comply with Section 1109.2.3.

((~~7~~)) 9. Where toilet facilities are primarily for children's use, required *accessible* water closets, toilet compartments and lavatories shall be permitted to comply with children's provision of ICC A117.1.

1109.2.1 Family or assisted-use toilet and bathing rooms. In assembly and mercantile occupancies, an *accessible* family or assisted-use toilet room shall be provided where an aggregate of six or more male and female water closets is required. In buildings of mixed occupancy, only those water closets required for the assembly or mercantile occupancy shall be used to

determine the family or assisted-use toilet room requirement. In recreational facilities where separate-sex bathing rooms are provided, an *accessible* family or assisted-use bathing room shall be provided. Fixtures located within family or assisted-use toilet and bathing rooms shall be included in determining the number of fixtures provided in an occupancy.

Exception: Where each separate-sex bathing room has only one shower or bathtub fixture, a family or assisted-use bathing room is not required.

1109.2.1.1 Standard. Family or assisted-use toilet and bathing rooms shall comply with Sections 1109.2.1.2 through 1109.2.1.7.

1109.2.1.2 Family or assisted-use toilet rooms. Family or assisted-use toilet rooms shall include only one water closet and only one lavatory. A family or assisted-use bathing room in accordance with Section 1109.2.1.3 shall be considered to be a family or assisted-use toilet room.

Exception: The following additional fixtures shall be permitted in a family or assisted-use toilet room:

1. A urinal.
2. A child-height water closet.
3. A child-height lavatory.

1109.2.1.3 Family or assisted-use bathing rooms. Family or assisted-use bathing rooms shall include only one shower or bathtub fixture. Family or assisted-use bathing rooms shall also include one water closet and one lavatory. Where storage facilities are provided for separate-sex bathing rooms, *accessible* storage facilities shall be provided for family or assisted-use bathing rooms.

1109.2.1.4 Location. Family or assisted-use toilet and bathing rooms shall be located on an *accessible route*. Family or assisted-use toilet rooms shall be located not more than one *story* above or below separate-sex toilet rooms. The *accessible route* from any separate-sex toilet room to a family or assisted-use toilet room shall not exceed 500 feet (152 m).

1109.2.1.5 Prohibited location. In passenger transportation facilities and airports, the *accessible route* from separate-sex toilet rooms to a family or assisted-use toilet room shall not pass through security checkpoints.

1109.2.1.6 Clear floor space. Where doors swing into a family or assisted-use toilet or bathing room, a clear floor space not less than 30 inches by 48 inches (762 mm by 1219 mm) shall be provided, within the room, beyond the area of the door swing.

1109.2.1.7 Privacy. Doors to family or assisted-use toilet and bathing rooms shall be securable from within the room.

[W] 1109.2.2 Water closet compartment. Where water closet compartments are provided in a toilet room or bathing room, at least 5 percent of the total number of compartments shall be wheelchair *accessible*. Where the combined total water closet compartments and urinals provided in a toilet room or bathing room is six or more, at least 5 percent of the total number of compartments shall be ambulatory *accessible*, provided in addition to the wheelchair-*accessible* compartment. Water closets designed for assisted toileting shall comply with Sections 1109.2.2.1 through 1109.2.2.6.

1109.2.2.1 Location. The centerline of the water closet shall be 24 inches (610 mm) minimum and 26 inches (660 mm) maximum from one side of the required clearance.

1109.2.2.2 Clearance. Clearance around the water closet shall comply with Sections 1109.2.2.2.1 through 1109.2.2.2.3.

1109.2.2.2.1 Clearance width. Clearance around a water closet shall be 66 inches (1675 mm) minimum in width, measured perpendicular from the side of the clearance that is 24 inches (610 mm) minimum and 26 inches (660 mm) maximum from the water closet centerline.

1109.2.2.2.2 Clearance depth. Clearance around the water closet shall be 78 inches (1980 mm) minimum in depth, measured perpendicular from the rear wall.

1109.2.2.2.3 Clearance overlap. The required clearance around the water closet shall be permitted overlaps per ICC A117.1 Section 604.3.3.

1109.2.2.3 Height. The height of the water closet seats shall comply with ICC A117.1 Section 604.4.

1109.2.2.4 Swing-up grab bars. The swing-up grab bars shall comply with ICC A117.1 Sections 609.2 and 609.8. Swing-up grab bars shall be provided on both sides of the water closet and shall comply with all of the following: the following:

1. The centerline of the grab bar shall be 14 inches minimum to 16 inches (356 mm to 405 mm) maximum from the centerline of the water closet.
2. The length of the grab bar is 36 inches (915 mm) minimum in length, measured from the rear wall to the end of the grab bar.
3. The top of the grab bar in the down position is 30 inches (760 mm) minimum and 34 inches (865 mm) maximum above the floor.

1109.2.2.5 Flush controls. Flush controls shall comply with ICC A117.1 Section 604.6.

1109.2.2.6 Dispensers. Toilet paper dispensers shall be mounted on at least one of the swing-up grab bars and the outlet of the dispenser shall be located at 24 inches (610 mm) minimum to 36 inches (915 mm) maximum from the rear wall.

[W] 1109.2.3 Standard roll-in-type shower compartment designed for assisted bathing. Standard roll-in-type shower compartments designed for assisted bathing shall comply with Sections 1109.2.3.1 through 1109.2.3.9.

1109.2.3.1 Size. Standard roll-in-type shower compartments shall have a clear inside dimension of 60 inches (1525 mm) minimum in width and 30 inches (760 mm) minimum in depth, measured at the center point of opposing sides. An entry 60 inches (1525 mm) minimum in width shall be provided.

1109.2.3.2 Clearance. A clearance of 60 inches (1525 mm) minimum in length adjacent to the 60 inch (1525 mm) width of the open face of the shower compartment, and 30 inches (760 mm) minimum in depth, shall be provided.

Exceptions:

1. A lavatory complying with Section 606 shall be permitted at one end of the clearance.
2. Where the shower compartment exceeds minimum sizes, the clear floor space shall be placed adjacent to the grab bars and 30 inches minimum from the back wall.

1109.2.3.3 Grab bars. Grab bars shall comply with ICC A117.1 Section 609 and shall be provided in accordance with Sections 1109.2.3.3.1 and 1109.2.3.3.2. In standard roll-in-type shower compartments, grab bars shall be provided on three walls. Where multiple grab bars are used, required horizontal grab bars shall be installed at the same height above the floor. Grab bars can be separate bars or one continuous bar.

1109.2.3.3.1 Back-wall grab bar. The back-wall grab bar shall extend the length of the back wall and extend within 6 inches (150 mm) maximum from the two adjacent side walls.

Exception: The back wall grab bar shall not be required to exceed 48 inches (1220 mm) in length. The rear grab bar shall be located with one end within 6 inches maximum of a side wall with a grab bar complying with Section 1109.2.3.3.2.

1109.2.3.3.2 Side-wall grab bars. The side-wall grab bars shall extend the length of the wall and extend within 6 inches (150 mm) maximum from the adjacent back wall.

Exceptions:

1. The side-wall grab bar shall not be required to exceed 30 inches (760 mm) in length. The side grab bar shall be located with one end within 6 inches maximum of the back wall with a grab bar complying with Section 1109.2.3.3.1.
2. Where the side walls are located 72 inches (1830 mm) or greater apart, a grab bar is not required on one of the side walls.

1109.2.3.4 Seats. Wall-mounted folding seats shall not be installed.

1109.2.3.5 Controls and hand showers. In standard roll-in-type showers, the controls and hand shower shall be located 38 inches (965 mm) minimum and 48 inches (1220 mm) maximum above the shower floor. Controls shall be located to facilitate caregiver access.

1109.2.3.6 Hand showers. Hand showers shall comply with ICC A117.1 Section 608.5.

1109.2.3.7 Thresholds. Thresholds shall comply with ICC A117.1 Section 608.6.

1109.2.3.8 Shower enclosures. Shower compartment enclosures for shower compartments shall comply with ICC A117.1 Section 608.7.

1109.2.3.9 Water temperature. Water temperature shall comply with ICC A117.1 Section 608.8.

[W] ((~~1109.2.3~~)) 1109.2.4 Lavatories. Where lavatories are provided, at least 5 percent, but not less than one, shall be *accessible*. Where an *accessible* lavatory is located within the *accessible* water closet compartment at least one additional *accessible* lavatory shall be provided in the multicompartment toilet room outside the water closet compartment. Where the total lavatories provided in a toilet room or bathing facility is six or more, at least one lavatory with enhanced reach ranges shall be provided.

[S] 1109.2.5 Portable toilets and bathing rooms. Where multiple single-user portable toilet or bathing units are clustered at a single location, at least 5 percent, but not less than one toilet unit or bathing unit at each cluster, shall be accessible. Signs containing the International Symbol of Accessibility shall identify *accessible* portable toilets and bathing units.

Exception: Portable toilet units provided for use exclusively by construction personnel on a construction site.

1109.3 Sinks. Where sinks are provided, at least 5 percent but not less than one provided in *accessible* spaces shall be *accessible*.

Exception: Mop or service sinks are not required to be *accessible*.

1109.4 Kitchens and kitchenettes. Where kitchens and kitchenettes are provided in *accessible* spaces or rooms, they shall be *accessible*.

1109.5 Drinking fountains. Where drinking fountains are provided on an exterior site, on a floor or within a secured area, the drinking fountains shall be provided in accordance with Sections 1109.5.1 and 1109.5.2.

[W] 1109.5.1 Minimum number. Not fewer than two drinking fountains shall be provided. One drinking fountain shall comply with the requirements for people who use a wheelchair and one drinking fountain shall comply with the requirements for standing persons.

Exceptions:

1. A single drinking fountain with two separate spouts that complies with the requirements for people who use a wheelchair and standing persons shall be permitted to be substituted for two separate drinking fountains.
2. Where drinking fountains are primarily for children's use, drinking fountains for people using wheelchairs shall be permitted to comply with the children's provisions in ICC A117.1 and drinking fountains for standing children shall be permitted to provide the spout at 30 inches (762 mm) minimum above the floor.
3. In all occupancies that require more than two drinking fountains per floor or secured area, bottle filling stations shall be allowed to be substituted in accordance with Section 2902.5.4.

1109.5.2 More than the minimum number. Where more than the minimum number of drinking fountains specified in Section 1109.5.1 is provided, 50 percent of the total number of drinking fountains provided shall comply with the requirements for persons who use a wheelchair and 50 percent of the total number of drinking fountains provided shall comply with the requirements for standing persons.

Exceptions:

1. Where 50 percent of the drinking fountains yields a fraction, 50 percent shall be permitted to be rounded up or down, provided that the total number of drinking fountains complying with this section equals 100 percent of the drinking fountains.
2. Where drinking fountains are primarily for children's use, drinking fountains for people using wheelchairs shall be permitted to comply with the children's provisions in ICC A117.1 and drinking fountains for standing children shall be permitted to provide the spout at 30 inches (762 mm) minimum above the floor.

1109.6 Saunas and steam rooms. Where provided, saunas and steam rooms shall be *accessible*.

Exception: Where saunas or steam rooms are clustered at a single location, at least 5 percent of the saunas and steam rooms, but not less than one, of each type in each cluster shall be *accessible*.

1109.7 Elevators. Passenger elevators on an *accessible route* shall be *accessible* and comply with Chapter 30.

1109.8 Lifts. Platform (wheelchair) lifts are permitted to be a part of a required *accessible route* in new construction where indicated in Items 1 through 10. Platform (wheelchair) lifts shall be installed in accordance with ASME A18.1.

1. An *accessible route* to a performing area and speaker platforms.
2. An *accessible route* to *wheelchair spaces* required to comply with the *wheelchair space* dispersion requirements of Sections 1108.2.2 through 1108.2.6.
3. An *accessible route* to spaces that are not open to the general public with an *occupant load* of not more than five.
4. An *accessible route* within an individual *dwelling unit* or *sleeping unit* required to be an *Accessible unit*, *Type A unit* or *Type B unit*.
5. An *accessible route* to jury boxes and witness stands; raised courtroom stations including judges' benches, clerks' stations, bailiffs' stations, deputy clerks' stations and court reporters' stations; and to depressed areas such as the well of the court.
6. An *accessible route* to load and unload areas serving amusement rides.
7. An *accessible route* to play components or soft contained play structures.
8. An *accessible route* to team or player seating areas serving *areas of sport activity*.
9. An *accessible route* instead of gangways serving recreational boating facilities and fishing piers and platforms.
10. An *accessible route* where existing exterior *site* constraints make use of a *ramp* or elevator infeasible.

1109.9 Storage. Where fixed or built-in storage elements such as cabinets, coat hooks, shelves, medicine cabinets, lockers, closets and drawers are provided in required *accessible* spaces, at least 5 percent, but not less than one of each type shall be *accessible*.

1109.9.1 Equity. *Accessible* facilities and spaces shall be provided with the same storage elements as provided in the similar nonaccessible facilities and spaces.

1. Operable parts that are intended for use only by service or maintenance personnel shall not be required to be *accessible*.
2. Electrical or communication receptacles serving a dedicated use shall not be required to be *accessible*.
3. Where two or more outlets are provided in a kitchen above a length of counter top that is uninterrupted by a sink or appliance, one outlet shall not be required to be *accessible*.
4. Floor electrical receptacles shall not be required to be *accessible*.
5. HVAC diffusers shall not be required to be *accessible*.
6. Except for light switches, where redundant controls are provided for a single element, one control in each space shall not be required to be *accessible*.
7. Access doors or gates in barrier walls and fences protecting pools, spas and hot tubs shall be permitted to comply with Section 1010.1.9.2.

1109.14 Fuel-dispensing systems. Fuel-dispensing systems shall be *accessible*.

[W] 1109.15 Gaming machines, ((~~and gaming tables~~)) depositories, vending machines, change machines and similar equipment. ((~~At least two percent of the total, but not fewer than one, of each gaming machine type and gaming table type shall be *accessible*. Where multiple gaming areas occur, accessible gaming machines and gaming tables shall be distributed throughout.~~)) Not fewer than one of each type of depository, vending machine, change machine and similar equipment shall be *accessible.* Two percent of gaming machines shall be *accessible* and provided with a front approach. *Accessible* gaming machines shall be distributed throughout the different types of gaming machines provided. **

Exception: Drive-up-only depositories are not required to comply with this section.

[W] 1109.16 Laundry equipment. Where provided in spaces required to be *accessible*, washing machines and clothes dryers shall comply with this section. **

1109.16.1 Washing machines. Where three or fewer washing machines are provided, at least one shall be accessible. Where more than three washing machines are provided, at least two shall be accessible.

1109.16.2 Clothes dryers. Where three or fewer clothes dryers are provided, at least one shall be accessible. Where more than three clothes dryers are provided, at least two shall be accessible.

[W] 1109.17 Mailboxes. Where *mailboxes* are provided in an interior location, at least 5 percent, but not less than one, of each type shall be accessible. In residential and institutional facilities, where *mailboxes* are provided for each *dwelling unit* or *sleeping unit*, accessible *mailboxes* shall be provided for each unit required to be an *accessible unit*. **

[W] 1109.18 Automatic teller machines and fare machines. Where automatic teller machines or self-service fare vending, collection or adjustment machines are provided, at least one machine of each type at each location where such machines are provided shall be *accessible*. Where bins are provided for envelopes, wastepaper or other purposes, at least one of each type shall be accessible. **

[W] 1109.19 Two-way communication systems. Where two-way communication systems are provided to gain admittance to a building or facility or to restricted areas within a building or facility, the system shall be accessible.

SECTION 1110
RECREATIONAL FACILITIES

1110.1 General. Recreational facilities shall be provided with *accessible* features in accordance with Sections 1110.2 through 1110.4.

[S] 1110.2 Facilities serving Group R-2 ((~~,~~)) and R-3 ((~~and R-4~~)) occupancies. Recreational facilities that serve Group R-2 ((~~,~~)) and R-3 ((~~and Group R-4~~)) occupancies shall comply with Sections 1110.2.1 through 1110.2.3, as applicable.

1110.2.1 Facilities serving Accessible units. In Group R-2 ((~~and R-4~~)) occupancies where recreational facilities serve *Accessible units*, every recreational facility of each type serving *Accessible units* shall be *accessible.*

1110.2.2 Facilities serving Type A and Type B units in a single building. In Group R-2 ((~~,~~)) and R-3 ((~~and R-4~~)) occupancies where recreational facilities serve a single building containing *Type A units* or *Type B units*, 25 percent, but not less than one, of each type of recreational facility shall be *accessible*. Every recreational facility of each type on a site shall be considered to determine the total number of each type that is required to be *accessible*.

1110.2.3 Facilities serving Type A and Type B units in multiple buildings. In Group R-2 ((~~,~~)) and R-3 ((~~and R-4~~)) occupancies on a single site where multiple buildings containing *Type A units* or *Type B units* are served by recreational facilities, 25 percent, but not less than one, of each type of recreational facility serving each building shall be *accessible*. The total number of each type of recreational facility that is required to be *accessible* shall be determined by considering every recreational facility of each type serving each building on the site.

1110.3 Other occupancies. Recreational facilities not falling within the purview of Section 1110.2 shall be *accessible*.

101 to 150	4
151 to 300	5
301 to 400	6
401 to 500	7
501 to 600	8
601 to 700	9
701 to 800	10
801 to 900	11
901 to 1000	12
1001 and over	12, plus 1 for every 100, or fraction thereof, over 1,000

1110.4.9.2 Dispersion. *Accessible* boat slips shall be dispersed throughout the various types of boat slips provided. Where the minimum number of *accessible* boat slips has been met, further dispersion shall not be required.

1110.4.9.3 Boarding piers at boat launch ramps. Where boarding piers are provided at boat launch ramps, at least 5 percent, but not less than one, of the boarding piers shall be *accessible*.

1110.4.10 Exercise machines and equipment. At least one of each type of exercise machine and equipment shall be on an *accessible route*.

1110.4.11 Fishing piers and platforms. Fishing piers and platforms shall be *accessible* and be on an *accessible route*.

1110.4.12 Miniature golf facilities. Miniature golf facilities shall comply with Sections 1110.4.12.1 through 1110.4.12.3.

1110.4.12.1 Minimum number. At least 50 percent of holes on miniature golf courses shall be *accessible*.

1110.4.12.2 Miniature golf course configuration. Miniature golf courses shall be configured so that the *accessible* holes are consecutive. Miniature golf courses shall provide an *accessible route* from the last *accessible* hole to the course entrance or exit without requiring travel through any other holes on the course.

Exception: One break in the sequence of consecutive holes shall be permitted provided that the last hole on the miniature golf course is the last hole in the sequence.

1110.4.12.3 Accessible route. Holes required to comply with Section 1110.4.12.1, including the start of play, shall be on an *accessible route*.

1110.4.13 Play areas. Play areas containing play components designed and constructed for children shall be located on an *accessible route*.

1110.4.14 Swimming pools, wading pools, hot tubs and spas. Swimming pools, wading pools, hot tubs and spas shall be *accessible* and be on an *accessible route*.

Exceptions:

1. Catch pools or a designated section of a pool used as a terminus for a water slide flume shall not be required to provide an *accessible* means of entry, provided that a portion of the catch pool edge is on an *accessible route*.
2. Where spas or hot tubs are provided in a cluster, at least 5 percent, but not less than one spa or hot tub in each cluster, shall be *accessible* and be on an *accessible route*.
3. Swimming pools, wading pools, spas and hot tubs that are required to be *accessible* by Sections 1110.2.2 and 1110.2.3 are not required to provide *accessible* means of entry into the water.

1110.4.14.1 Raised diving boards and diving platforms. Raised diving boards and diving platforms are not required to be *accessible* or to be on an *accessible route*.

1110.4.14.2 Water slides. Water slides are not required to be *accessible* or to be on an *accessible route*.

1110.4.15 Shooting facilities with firing positions. Where shooting facilities with firing positions are designed and constructed at a site, at least 5 percent, but not less than one, of each type of firing position shall be *accessible* and be on an *accessible route*.

SECTION 1111
SIGNAGE

[S] 1111.1 Signs. Required *accessible* elements shall be identified by the International Symbol of Accessibility at the following locations.

1. *Accessible* parking spaces required by Section 1106.1.

   Exception: Where the total number of parking spaces provided is four or less, identification of *accessible* parking spaces is not required.

2. *Accessible* parking spaces required by Section 1106.2.

   Exception: In Group I-1, R-2, and R-3 ((~~and R-4~~)) facilities, where parking spaces are assigned to specific *dwelling units* or *sleeping units*, identification of *accessible* parking spaces is not required.

3. *Accessible* passenger loading zones.
4. *Accessible* rooms where multiple single-user toilet or bathing rooms are clustered at a single location.
5. *Accessible* entrances where not all entrances are *accessible*.
6. *Accessible* check-out aisles where not all aisles are *accessible*. The sign, where provided, shall be above the check-out aisle in the same location as the checkout aisle number or type of check-out identification.
7. Family or assisted-use toilet and bathing rooms.
8. *Accessible* dressing, fitting and locker rooms where not all such rooms are *accessible*.
9. *Accessible* areas of refuge in accordance with Section 1009.9.
10. Exterior areas for assisted rescue in accordance with Section 1009.9.
11. In recreational facilities, lockers that are required to be *accessible* in accordance with Section 1109.9.

1111.2 Directional signage. Directional signage indicating the route to the nearest like *accessible* element shall be provided at the following locations. These directional signs shall include the International Symbol of Accessibility and sign characters shall meet the visual character requirements in accordance with ICC A117.1.

1. Inaccessible building entrances.
2. Inaccessible public toilets and bathing facilities.
3. Elevators not serving an *accessible route*.
4. At each separate-sex toilet and bathing room indicating the location of the nearest family/assisted use toilet or bathing room where provided in accordance with Section 1109.2.1.
5. At *exits* and *exit stairways* serving a required *accessible* space, but not providing an *approved* accessible *means of egress*, signage shall be provided in accordance with Section 1009.10.
6. Where drinking fountains for persons using wheelchairs and drinking fountains for standing persons are not located adjacent to each other, directional signage shall be provided indicating the location of the other drinking fountains.

[S] 1111.3 Other signs. Signage indicating special accessibility provisions shall be provided as shown.

1. Each assembly area required to comply with Section 1108.2.7 shall provide a sign notifying patrons of the availability of assistive listening systems. The sign shall comply with ICC A117.1 requirements for visual characters and include the International Symbol of Access for Hearing Loss.

   Exception: Where ticket offices or windows are provided, signs are not required at each assembly area provided that signs are displayed at each ticket office or window informing patrons of the availability of assistive listening systems.

2. At each door to an *area of refuge* providing direct access to a *stairway*, exterior area for assisted rescue, exit *stairway*, *exit passageway* or *exit discharge*, signage shall be provided in accordance with Section 1013.4.
3. At *areas of refuge*, signage shall be provided in accordance with Section 1009.11.
4. At exterior areas for assisted rescue, signage shall be provided in accordance with Section 1009.11.
5. At two-way communication systems, signage shall be provided in accordance with Section 1009.8.2.
6. In *interior exit stairways* and *ramps*, floor level signage shall be provided in accordance with Section 1023.9.
7. Signs identifying the type of access provided on amusement rides required to be *accessible* by Section 1110.4.8 shall be provided at entries to queues and waiting lines. In addition, where *accessible* unload areas also serve as *accessible* load areas, signs indicating the location of the *accessible* load and unload areas shall be provided at entries to queues and waiting lines. These directional sign characters shall meet the visual character requirements in accordance with ICC A117.1.
8. At bus stops and terminals, signage shall be provided in accordance with Section 1113.4.
9. At fixed facilities and stations, signage shall be provided in accordance with Sections 1114.2.2 through 1114.2.2.3.
10. At airports, terminal information systems shall be provided in accordance with Section 1115.3.

1111.4 Variable message signs. Where provided in the locations in Sections 1111.4.1 and 1111.4.2, variable message signs shall comply with the variable message sign requirements of ICC A117.1.

1111.4.1 Transportation facilities. Where provided in transportation facilities, variable message signs conveying transportation-related information shall comply with Section 1111.4.

1111.4.2 Emergency shelters. Where provided in buildings that are designated as emergency shelters, variable message signs conveying emergency-related information shall comply with Section 1111.4.

Exception: Where equivalent information is provided in an audible manner, variable message signs are not required to comply with ICC A117.1.

[W] 1111.5 Designations. Interior and exterior signs identifying permanent rooms and spaces shall be visual characters, raised characters and braille complying with ICC A117.1. Where pictograms are provided as designations of interior rooms and spaces, the pictograms shall have visual characters, raised characters and braille complying with ICC A117.1. **

Exceptions:

1. Exterior signs that are not located at the door to the space they serve are not required to comply.
2. Building directories, menus, seat and row designations in assembly areas, occupant names, building addresses and company names and logos are not required to comply.
3. Signs in parking facilities are not required to comply.
4. Temporary (seven days or less) signs are not required to comply.
5. In detention and correctional facilities, signs not located in public areas are not required to comply.

[W] 1111.6 Directional and informational signs. Signs that provide direction to, or information about, permanent interior spaces of the site and facilities shall contain visual characters complying with ICC A117.1. **

Exception: Building directories, personnel names, company or occupant names and logos, menus and temporary (seven days or less) signs are not required to comply with ICC A117.1.

[W] SECTION 1112 TELEPHONES **

[W] 1112.1 General. Where coin-operated public pay telephones, coinless public pay telephones, public *closed-circuit telephones*, courtesy phones or other types of public telephones are provided, *accessible* public telephones shall be provided in accordance with Sections 1112.2 through 1112.5 for each type of public telephone provided. For purposes of this section, a bank of telephones shall be considered two or more adjacent telephones.

[W] 1112.2 Wheelchair-accessible telephones. Where public telephones are provided, *wheelchair-accessible* telephones shall be provided in accordance with Table 1112.2.

Exception: Drive-up-only public telephones are not required to be *accessible*.

TABLE 1112.2
WHEELCHAIR-ACCESSIBLE TELEPHONES

NUMBER OF TELEPHONES PROVIDED ON A FLOOR, LEVEL OR EXTERIOR SITE	MINIMUM REQUIRED NUMBER OF WHEELCHAIR-ACCESSIBLE TELEPHONES
1 or more single unit	1 per floor, level and exterior site
1 bank	1 per floor, level and exterior site
2 or more banks	1 per bank

[W] 1112.3 Volume controls. All public telephones provided shall have accessible volume control.

[W] 1112.4 TTYs. TTYs shall be provided in accordance with Sections 1112.4.1 through 1112.4.9.

1112.4.1 Bank requirement. Where four or more public pay telephones are provided at a bank of telephones, at least one public TTY shall be provided at that bank.

Exception: TTYs are not required at banks of telephones located within 200 feet (60 960 mm) of, and on the same floor as, a bank containing a public TTY.

1112.4.2 Floor requirement. Where four or more public pay telephones are provided on a floor of a privately owned building, at least one public TTY shall be provided on that floor. Where at least one public pay telephone is provided on a floor of a publicly owned building, at least one public TTY shall be provided on that floor.

1112.4.3 Building requirement. Where four or more public pay telephones are provided in a privately owned building, at least one public TTY shall be provided in the building. Where at least one public pay telephone is provided in a publicly owned building, at least one public TTY shall be provided in the building.

1112.4.4 Site requirement. Where four or more public pay telephones are provided on a site, at least one public TTY shall be provided on the site.

1112.4.5 Rest stops, emergency road stops, and service plazas. Where a public pay telephone is provided at a public rest stop, emergency road stop or service plaza, at least one public TTY shall be provided.

1112.4.6 Hospitals. Where a public pay telephone is provided in or adjacent to a hospital emergency room, hospital recovery room or hospital waiting room, at least one public TTY shall be provided at each such location.

1112.4.7 Transportation facilities. Transportation facilities shall be provided with TTYs in accordance with Sections 1114.2.5 and 1115.2 in addition to the TTYs required by Sections 1112.4.1 through 1112.4.4.

1112.4.8 Detention and correctional facilities. In detention and correctional facilities, where a public pay telephone is provided in a secured area used only by detainees or inmates and security personnel, then at least one TTY shall be provided in at least one secured area.

1112.4.9 Signs. Public TTYs shall be identified by the International Symbol of TTY complying with ICC A117.1. Directional signs indicating the location of the nearest public TTY shall be provided at banks of public pay telephones not containing a public TTY. Additionally, where signs provide direction to public pay telephones, they shall also provide direction to public TTYs. Such signs shall comply with visual signage requirements in ICC A117.1 and shall include the International Symbol of TTY.

[W] 1112.5 Shelves for portable TTYs. Where a bank of telephones in the interior of a building consists of three or more public pay telephones, at least one public pay telephone at the bank shall be provided with a shelf and an electrical outlet.

Exceptions:

1. In secured areas of detention and correctional facilities, if shelves and outlets are prohibited for purposes of security or safety shelves and outlets for TTYs are not required to be provided.
2. The shelf and electrical outlet shall not be required at a bank of telephones with a TTY.

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[W] SECTION 1113
BUS STOPS

[W] 1113.1 General. Bus stops shall comply with Sections 1113.2 through 1113.5.

[W] 1113.2 Bus boarding and alighting areas. Bus boarding and alighting areas shall comply with Sections 1113.2.1 through 1113.2.4.

1113.2.1 Surface. Bus boarding and alighting areas shall have a firm, stable surface.

1113.2.2 Dimensions. Bus boarding and alighting areas shall have a clear length of 96 inches (2440 mm) minimum, measured perpendicular to the curb or vehicle roadway edge, and a clear width of 60 inches (1525 mm) minimum, measured parallel to the vehicle roadway.

1113.2.3 Connection. Bus boarding and alighting areas shall be connected to streets, sidewalks or pedestrian paths by an *accessible route* complying with Section 1104.

1113.2.4 Slope. Parallel to the roadway, the slope of the bus boarding and alighting area shall be the same as the roadway, to the maximum extent practicable. For water drainage, a maximum slope of 1:48 perpendicular to the roadway is allowed.

[W] 1113.3 Bus shelters. Where provided, new or replaced bus shelters shall provide a minimum clear floor or ground space complying with ICC A117.1, Section 305, entirely within the shelter. Such shelters shall be connected by an *accessible route* to the boarding area required by Section 1113.2.

[W] 1113.4 Signs. New bus route identification signs shall have finish and contrast complying with ICC A117.1. Additionally, to the maximum extent practicable, new bus route identification signs shall provide visual characters complying with ICC A117.1.

Exception: Bus schedules, timetables and maps that are posted at the bus stop or bus bay are not required to meet this requirement.

[W] 1113.5 Bus stop siting. Bus stop sites shall be chosen such that, to the maximum extent practicable, the areas where lifts or ramps are to be deployed comply with Sections 1113.2 and 1113.3.

[W] SECTION 1114 TRANSPORTATION FACILITIES AND STATIONS **

[W] 1114.1 General. Fixed transportation facilities and stations shall comply with the applicable provisions of Section 1114.2.

[W] 1114.2 New construction. New stations in rapid rail, light rail, commuter rail, intercity rail, high speed rail and other fixed guideway systems shall comply with Sections 1114.2.1 through 1114.2.8.

[W] 1114.2.1 Station entrances. Where different entrances to a station serve different transportation fixed routes or groups of fixed routes, at least one entrance serving each group or route shall comply with Section 1104.

[W] 1114.2.2 Signs. Signage in fixed transportation facilities and stations shall comply with Sections 1114.2.2.1 through 1114.2.2.3.

1114.2.2.1 Raised character and braille signs. Where signs are provided at entrances to stations identifying the station or the entrance, or both, at least one sign at each entrance shall be raised characters and braille. A minimum of one raised character and braille sign identifying the specific station shall be provided on each platform or boarding area. Such signs shall be placed in uniform locations at entrances and on platforms or boarding areas within the transit system to the maximum extent practicable.

Exceptions:

1. Where the station has no defined entrance but signs are provided, the raised characters and braille signs shall be placed in a central location.
2. Signs are not required to be raised characters and braille where audible signs are remotely transmitted to hand-held receivers, or are user or proximity actuated.

1114.2.2.2 Identification signs. Stations covered by this section shall have identification signs containing visual characters complying with ICC A117.1. Signs shall be clearly visible and within the sightlines of a standing or sitting passenger from within the train on both sides when not obstructed by another train.

1114.2.2.3 Informational signs. Lists of stations, routes and destinations served by the station which are located on boarding areas, platforms or mezzanines shall provide visual characters complying with ICC A117.1 Signs covered by this provision shall, to the maximum extent practicable, be placed in uniform locations within the transit system.

[W] 1114.2.3 Fare machines. Self-service fare vending, collection and adjustment machines shall comply with ICC A117.1, Section 707. Where self-service fare vending, collection or adjustment machines are provided for the use of the general public, at least one accessible machine of each type provided shall be provided at each accessible point of entry and exit.

[W] 1114.2.4 Rail-to-platform height. Station platforms shall be positioned to coordinate with vehicles in accordance with the applicable provisions of 36 CFR, Part 1192. Low-level platforms shall be 8 inches (250 mm) minimum above top of rail.

Exception: Where vehicles are boarded from sidewalks or street level, low-level platforms shall be permitted to be less than 8 inches (250 mm).

[W] 1114.2.5 TTYs. Where a public pay telephone is provided in a transit facility (as defined by the Department of Transportation) at least one public TTY complying with ICC A117.1, Section 704.4, shall be provided in the station. In addition, where one or more public pay telephones serve a particular entrance to a transportation facility, at least one TTY telephone complying with ICC A117.1, Section 704.4, shall be provided to serve that entrance.

[W] 1114.2.6 Track crossings. Where a *circulation path* serving boarding platforms crosses tracks, an *accessible route* shall be provided.

Exception: Openings for wheel flanges shall be permitted to be 2-1/2 inches (64 mm) maximum.

[W] 1114.2.7 Public address systems. Where public address systems convey audible information to the public, the same or equivalent information shall be provided in a visual format.

[W] 1114.2.8 Clocks. Where clocks are provided for use by the general public, the clock face shall be uncluttered so that its elements are clearly visible. Hands, numerals and digits shall contrast with the background either light-on-dark or dark-on-light. Where clocks are mounted overhead, numerals and digits shall comply with visual character requirements.

[W] SECTION 1115 AIRPORTS **

[W] 1115.1 New construction. New construction of airports shall comply with Sections 1115.2 through 1115.4.

[W] 1115.2 TTYs. Where public pay telephones are provided, at least one TTY shall be provided in compliance with ICC A117.1, Section 704.4. Additionally, if four or more public pay telephones are located in a main terminal outside the security areas, a concourse within the security areas or a baggage claim area in a terminal, at least one public TTY complying with ICC A117.1, Section 704.4, shall also be provided in each such location.

[W] 1115.3 Terminal information systems. Where terminal information systems convey audible information to the public, the same or equivalent information shall be provided in a visual format.

[W] 1115.4 Clocks. Where clocks are provided for use by the general public, the clock face shall be uncluttered so that its elements are clearly visible. Hands, numerals and digits shall contrast with the background either light-on-dark or dark-on-light. Where clocks are mounted overhead, numerals and digits shall comply with visual character requirements.

CHAPTER 12

INTERIOR ENVIRONMENT

User note:

About this chapter: *Chapter 12 provides minimum provisions for the interior of buildings—the occupied environment. Ventilation, lighting, and space heating are directly regulated in this chapter and in conjunction with the* International Mechanical Code® *and the* International Energy Conservation Code®*. Minimum room size and maximum room-to-room sound transmission are set for certain occupancies.*

SECTION 1201
GENERAL

1201.1 Scope. The provisions of this chapter shall govern ventilation, temperature control, lighting, *yards* and *courts*, sound transmission, room dimensions, surrounding materials and rodentproofing associated with the interior spaces of buildings.

SECTION 1202
VENTILATION

[W] 1202.1 General. Buildings shall be provided with natural ventilation in accordance with Section 1202.5, or mechanical ventilation in accordance with the *International Mechanical Code*.

((~~Where the air infiltration rate in a *dwelling unit* is less than 5 air changes per hour where tested with a blower door at a pressure 0.2 inch w.c. (50 Pa) in accordance with Section R402.4.1.2 of the *International Energy Conservation Code—Residential Provisions*, the *dwelling unit* shall be ventilated by mechanical means in accordance with Section 403 of the *International Mechanical Code*.~~)) *Ambulatory care facilities* and Group I-2 occupancies shall be ventilated by mechanical means in accordance with Section 407 of the *International Mechanical Code*.

1202.2 Roof ventilation. Roof assemblies shall be ventilated in accordance with this section or shall comply with Section 1202.3.

[W][S] 1202.2.1 ((~~Ventilated attics and rafter~~)) Attic spaces. Enclosed *attics* and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof framing members shall have cross ventilation for each separate space by ventilation openings protected against the entrance of rain and snow. Blocking and bridging shall be arranged so as not to interfere with the movement of air. An airspace of not less than 1 inch (25 mm) shall be provided between the insulation and the roof sheathing. The net free ventilating area shall be not less than 1/150 of the area of the space ventilated. Ventilators shall be installed in accordance with manufacturer's installation instructions.

Exception: The net free cross-ventilation area shall be permitted to be reduced to 1/300 ((~~provided both of the following conditions are met:~~

~~1. In Climate Zones 6, 7 and 8, a Class I or II vapor retarder is installed on the warm-in-winter side of the ceiling.~~

~~2. At~~)) if at least 40 percent and not more than 50 percent of the required venting area is provided by ventilators located in the upper portion of the *attic* or rafter space. Upper ventilators shall be located not more than 3 feet (914 mm) below the ridge or highest point of the space, measured vertically, with the balance of the *ventilation* provided by eave or cornice vents. Where the location of wall or roof framing members conflicts with the installation of upper ventilators, installation more than 3 feet (914 mm) below the ridge or highest point of the space shall be permitted.

1202.2.2 Openings into attic. Exterior openings into the *attic* space of any building intended for human occupancy shall be protected to prevent the entry of birds, squirrels, rodents, snakes and other similar creatures. Openings for ventilation having a least dimension of not less than 1/16 inch (1.6 mm) and not more than 1/4 inch (6.4 mm) shall be permitted. Openings for ventilation having a least dimension larger than 1/4 inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth, perforated vinyl or similar material with openings having a least dimension of not less than 1/16 inch (1.6 mm) and not more than 1/4 inch (6.4 mm). Where combustion air is obtained from an *attic* area, it shall be in accordance with Chapter 7 of the *International Mechanical Code*.

[S] 1202.3 Unvented attic and unvented enclosed rafter assemblies. Unvented *attics* and unvented enclosed roof framing assemblies created by ceilings applied directly to the underside of the roof framing members/rafters and the structural roof sheathing at the top of the roof framing members shall be permitted where all of the following conditions are met:

1. The unvented *attic* space is completely within the *building thermal envelope*.

2. No interior Class I vapor retarders are installed on the ceiling side (*attic* floor) of the unvented *attic* assembly or on the ceiling side of the unvented enclosed roof framing assembly.
3. Where wood shingles or shakes are used, not less than a 1/4-inch (6.4 mm) vented airspace separates the shingles or shakes and the roofing underlayment above the structural sheathing.

((~~4. In Climate Zones 5, 6, 7 and 8, any air-impermeable insulation shall be a Class II vapor retarder or shall have a Class II vapor retarder coating or covering in direct contact with the underside of the insulation.~~

~~5~~)) 4. Insulation shall be located in accordance with the following:

((~~5.1~~)) 4.1. Item ((~~5.1.1, 5.1.2, 5.1.3 or 5.1.4~~)) 4.1.1, 4.1.2, 4.1.3 or 4.1.4 shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.

((~~5.1.1~~)) 4.1.1. Where only air-impermeable insulation is provided, it shall be applied in direct contact with the underside of the structural roof sheathing.

((~~5.1.2~~)) 4.1.2. Where air-permeable insulation is provided inside the building thermal envelope, it shall be installed in accordance with Item ((~~5.1.1~~)) 4.1.1. In addition to the air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing ((~~in accordance with the *R* values in Table 1202.3 for condensation control~~)) and shall have a minimum R value of 10.

((~~5.1.3~~)) 4.1.3. Where both air-impermeable and air-permeable insulation are provided, the *air-impermeable insulation* shall be applied in direct contact with the underside of the structural roof sheathing in accordance with Item ((~~5.1.1~~)) 4.1.1 and shall ((~~be in accordance with the *R*-values in Table 1202.3 for condensation control~~)) have a minimum R value of 10. The *air-permeable insulation* shall be installed directly under the *air-impermeable insulation.*

((~~5.1.4~~)) 4.1.4. Alternatively, sufficient rigid board or sheet insulation shall be installed directly above the structural roof sheathing to maintain the monthly average temperature of the underside of the structural roof sheathing above 45°F (7°C). For calculation purposes, an interior air temperature of 68°F (20°C) is assumed and the exterior air temperature is assumed to be the monthly average outside air temperature of the three coldest months.

((~~5.2~~)) 4.2. Where preformed insulation board is used as the *air-impermeable insulation* layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.

((~~Exceptions~~)) Exception: ((~~1.~~)) Section 1202.3 does not apply to special use structures or enclosures such as swimming pool enclosures, data processing centers, hospitals or art galleries.

((~~2. Section 1202.3 does not apply to enclosures in Climate Zones 5 through 8 that are humidified beyond 35 percent during the three coldest months.~~))

[S] ((~~TABLE 1202.3~~
~~INSULATION FOR CONDENSATION CONTROL~~

~~CLIMATE ZONE~~	~~MINIMUM *R* VALUE OF AIR-IMPERMEABLE INSULATION~~[a]
~~2B and 3B tile roof only~~	~~0 (none required)~~
~~1, 2A, 2B, 3A, 3B, 3C~~	~~R-5~~
~~4C~~	~~R-10~~
~~4A, 4B~~	~~R-15~~
~~5~~	~~R-20~~
~~6~~	~~R-25~~
~~7~~	~~R-30~~
~~8~~	~~R-35~~

~~a. Contributes to, but does not supersede, thermal resistance requirements for attic and roof assemblies in Section C402.2.1 of the *International Energy Conservation Code*.~~))

[W] 1202.4 Under-floor ventilation. The space between the bottom of the floor joists and the earth under any building except spaces occupied by basements or cellars shall be provided with ventilation in accordance with Section 1202.4.1, 1202.4.2 or 1202.4.3. A ground cover of six mil (0.006 inch thick) black polyethylene or *approved* equal shall be laid over the ground within crawl spaces. The ground cover shall be overlapped six inches minimum at the joints and shall extend to the foundation wall.

Exception: The ground cover may be omitted in crawl spaces if the crawl space has a concrete slab floor with a minimum thickness of two inches.

1202.4.1 Ventilation openings. Ventilation openings through foundation walls shall be provided. The openings shall be placed so as to provide cross ventilation of the under-floor space. The net area of ventilation openings shall be in accordance

with Section 1202.4.1.1 or 1202.4.1.2. Ventilation openings shall be covered for their height and width with any of the following materials, provided that the least dimension of the covering shall be not greater than 1/4 inch (6.4 mm):

1. Perforated sheet metal plates not less than 0.070 inch (1.8 mm) thick.
2. Expanded sheet metal plates not less than 0.047 inch (1.2 mm) thick.
3. Cast-iron grilles or gratings.
4. Extruded load-bearing vents.
5. Hardware cloth of 0.035-inch (0.89 mm) wire or heavier.
6. Corrosion-resistant wire mesh, with the least dimension not greater than 1/8 inch (3.2 mm).
7. Operable louvres, where ventilation is provided in accordance with Section 1202.4.1.2.

1202.4.1.1 Ventilation area for crawl spaces with open earth floors. The net area of ventilation openings for crawl spaces with uncovered earth floors shall be not less than 1 square foot for each 150 square feet (0.67 m^2 for each 100 m^2) of crawl space area.

1202.4.1.2 Ventilation area for crawl spaces with covered floors. The net area of ventilation openings for crawl spaces with the ground surface covered with a Class I vapor retarder shall be not less than 1 square foot for each 1,500 square feet (0.67 m^2 for each 1000 m^2) of crawl space area.

1202.4.2 Ventilation in cold climates. In extremely cold climates, where a ventilation opening will cause a detrimental loss of energy, ventilation openings to the interior of the structure shall be provided.

1202.4.3 Mechanical ventilation. Mechanical ventilation shall be provided to crawl spaces where the ground surface is covered with a Class I vapor retarder. Ventilation shall be in accordance with Section 1202.4.3.1 or 1202.4.3.2.

1202.4.3.1 Continuous mechanical ventilation. Continuously operated mechanical ventilation shall be provided at a rate of 1.0 cubic foot per minute (cfm) for each 50 square feet (1.02 L/s for each 10 m^2) of crawl space ground surface area and the ground surface shall be covered with a Class I vapor retarder.

1202.4.3.2 Conditioned space. The crawl space shall be conditioned in accordance with the *International Mechanical Code* and the walls of the crawl space shall be insulated in accordance with the *International Energy Conservation Code.*

1202.4.4 Flood hazard areas. For buildings in flood hazard areas as established in Section 1612.3, the openings for underfloor ventilation shall be deemed as meeting the flood opening requirements of ASCE 24 provided that the ventilation openings are designed and installed in accordance with ASCE 24.

[W] 1202.5 Natural ventilation. ((~~Natural~~)) Where provided in other than Group R occupancies, natural *ventilation* of an occupied space shall be through windows, doors, louvers or other openings to the outdoors. The operating mechanism for such openings shall be provided with ready access so that the openings are readily controllable by the building occupants. Group R occupancies shall comply with the *International Mechanical Code*.

1202.5.1 Ventilation area required. The openable area of the openings to the outdoors shall be not less than 4 percent of the floor area being ventilated.

1202.5.1.1 Adjoining spaces. Where rooms and spaces without openings to the outdoors are ventilated through an adjoining room, the opening to the adjoining room shall be unobstructed and shall have an area of not less than 8 percent of the floor area of the interior room or space, but not less than 25 square feet (2.3 m^2). The openable area of the openings to the outdoors shall be based on the total floor area being ventilated.

Exception: Exterior openings required for *ventilation* shall be allowed to open into a sunroom with *thermal isolation* or a patio cover provided that the openable area between the sunroom addition or patio cover and the interior room shall have an area of not less than 8 percent of the floor area of the interior room or space, but not less than 20 square feet (1.86 m^2). The openable area of the openings to the outdoors shall be based on the total floor area being ventilated.

1202.5.1.2 Openings below grade. Where openings below grade provide required natural *ventilation*, the outside horizontal clear space measured perpendicular to the opening shall be one and one-half times the depth of the opening. The depth of the opening shall be measured from the average adjoining ground level to the bottom of the opening.

1202.5.2 Contaminants exhausted. Contaminant sources in naturally ventilated spaces shall be removed in accordance with the *International Mechanical Code* and the *International Fire Code*.

1202.5.2.1 Bathrooms. Rooms containing bathtubs, showers, spas and similar bathing fixtures shall be mechanically ventilated in accordance with the *International Mechanical Code*.

1202.5.3 Openings on yards or courts. Where natural *ventilation* is to be provided by openings onto *yards* or *courts*, such *yards* or *courts* shall comply with Section 1205.

1202.6 Other ventilation and exhaust systems. *Ventilation* and exhaust systems for occupancies and operations involving flammable or combustible hazards or other contaminant sources as covered in the *International Mechanical Code* or the *International Fire Code* shall be provided as required by both codes.

[W] 1202.7 Crawlspace ventilation. All crawlspaces shall be ventilated as specified in Section 1202.4. If the installed ventilation in a crawlspace is less than one square foot for each 300 square feet of crawlspace area, or if the crawlspace vents are equipped with operable louvers, a radon vent shall be installed to originate from a point between the ground cover and soil. The radon vent shall be installed in accordance with Sections 1202.7.2 through 1202.7.6.

1202.7.1 Crawlspace plenum systems. In crawlspace plenum systems used for providing supply air for an HVAC system, aggregate, a permanently sealed soil gas retarder membrane and a radon vent pipe shall be installed in accordance with Section 1202.7.2 through 1202.7.6. Crawlspaces shall not be used for return air plenums.

In addition, an operable radon vent fan shall be installed and activated. The fan shall be located as specified in Section 1202.7.6. The fan shall be capable of providing at least 100 cfm at 1-inch water column static pressure. The fan shall be controlled by a readily accessible manual switch. The switch shall be labeled "RADON VENT FAN."

1202.7.2 Aggregate. A layer of aggregate of 4-inch minimum thickness shall be placed beneath concrete slabs. The aggregate shall be continuous to the extent practical.

[S] 1202.7.2.1 Aggregate grade. Aggregate shall:

1. Comply with ASTM Standard C-33 Standard Specification for Concrete Aggregate and shall be size No. 8 or larger size aggregate as listed in Table 2, Grading Requirements for Coarse Aggregate; or
2. Meet the 1988 Washington State Department of Transportation Specification 9-03.1 (3) "Coarse Aggregate for Portland Cement Concrete," or any equivalent successor standards. Aggregate size shall be of Grade 8 or larger as listed in Section 9-03.1 (3) C, "Grading"; or
3. Be screened, washed pea gravel free of deleterious substances in a manner consistent with ASTM Standard C-33 with 100 percent passing a 1/2-inch sieve and less than 5 percent passing a No. 16 sieve. Sieve characteristics shall conform to those acceptable under ASTM Standard C-33.

Exception: Aggregate shall not be required if a substitute material or system, with sufficient load-bearing characteristics, and having *approved* capability to provide equal or superior air flow, is installed.

1202.7.3 Soil-gas retarder membrane. A soil-gas retarder membrane, consisting of at least one layer of virgin polyethylene with a thickness of at least 6 mil, or equivalent flexible sheet material, shall be either placed directly under all concrete slabs so that the slab is in direct contact with the membrane, or on top of the aggregate with 2 inches minimum of fine sand or pea gravel installed between the concrete slab and membrane. The flexible sheet shall extend to the foundation wall or to the outside edge of the monolithic slab. Seams shall overlap at least 12 inches. The membrane shall also be fitted tightly to all pipes, wires, and other penetrations of the membrane and sealed with an *approved* sealant or tape. All punctures or tears shall be repaired with the same or *approved* material and similarly lapped and sealed.

1202.7.4 Sealing of penetrations and joints. All penetrations and joints in concrete slabs or other floor systems and walls below grade shall be sealed by an *approved* sealant to create an air barrier to limit the movement of soil-gas into the indoor air.

Sealants shall be *approved* by the manufacturer for the intended purpose. Sealant joints shall conform to manufacturer's specifications. The sealant shall be placed and tooled in accordance with manufacturer's specifications. There shall be no gaps or voids after the sealant has cured.

1202.7.5 Radon vent. One continuous sealed pipe shall run from a point within the aggregate under each concrete slab to a point outside the building. Joints and connections shall be permanently gas tight. The continuous sealed pipe shall interface with the aggregate in the following manner, or by other *approved* equal method. The pipe shall be permanently connected to a "T" within the aggregate area so that the two end openings of the "T" lie within the aggregate area. A minimum of 5 feet of perforated drain pipe of 3 inches minimum diameter shall join to and extend from the "T." The perforated pipe shall remain in the aggregate area and shall not be capped at the ends. The "T" and its perforated pipe extensions shall be located at least 5 feet horizontally from the exterior perimeter of the aggregate area.

The continuous sealed pipe shall terminate no less than 12 inches above the eave, and more than 10 horizontal feet from a woodstove or fireplace chimney, or operable window. The continuous sealed pipe shall be labeled "radon vent." The label shall be placed so as to remain visible to an occupant.

The minimum pipe diameter shall be 3 inches unless otherwise *approved*. Acceptable sealed plastic pipe shall be smooth walled, and may include either PVC schedule 40 or ABS schedule of equivalent wall thickness.

The entire sealed pipe system shall be sloped to drain to the subslab aggregate.

The sealed pipe system may pass through an unconditioned *attic* before exiting the building; but to the extent practicable, the sealed pipe shall be located inside the thermal envelope of the building in order to enhance passive stack venting.

Exception: A fan for subslab depressurization system includes the following:

1. Soil-gas retarder membrane as specified in Section 1202.7.3;

2. Sealing of penetrations and joints as specified in Section 1202.7.4;
3. A 3-inch continuous sealed radon pipe shall run from a point within the aggregate under each concrete slab to a point outside the building;
4. Joints and connections shall be gas tight, and may be of either PVC schedule 40 or ABS schedule of equivalent wall thickness;
5. A label of "radon vent" shall be placed on the pipe so as to remain visible to an occupant;
6. Fan circuit and wiring as specified in Section 1202.7.6 and a fan.

If the subslab depressurization system is exhausted through the concrete foundation wall or rim joist, the exhaust terminus shall be a minimum of 6 feet from operable windows or outdoor air intake vents and shall be directed away from operable windows and outdoor air intake vents to prevent radon reentrainment.

1202.7.6 Fan circuit and wiring and location. An area for location of an in-line fan shall be provided. The location shall be as close as practicable to the radon vent pipe's point of exit from the building, or shall be outside the building shell; and shall be located so that the fan and all downstream piping is isolated from the indoor air. Provisions shall be made to allow future activation of an inline fan on the radon vent pipe without the need to place new wiring. A 110 volt power supply shall be provided at a junction box near the fan location.

1202.7.7 Separate aggregate areas. If the 4-inch aggregate area underneath the concrete slab is not continuous, but is separated into distinct isolated aggregate areas by a footing or other barrier, a minimum of one radon vent pipe shall be installed into each separate aggregate area.

Exception: Separate aggregate areas may be considered a single area if a minimum 3-inch diameter connection joining the separate areas is provided for every 30 feet of barrier separating those areas.

1202.7.8 Concrete block walls. Concrete block walls connected to below grade areas shall be considered unsealed surfaces. All openings in concrete block walls that will not remain accessible upon completion of the building shall be sealed at both vertical and horizontal surfaces, in order to create a continuous air barrier to limit the transport of soil-gas into the indoor air.

SECTION 1203
TEMPERATURE CONTROL

[W][S] 1203.1 Equipment and systems. Interior spaces intended for human occupancy shall be provided with active or passive space heating systems capable of maintaining an indoor temperature of not less than 68°F (20°C) at a point 3 feet (914 mm) above the floor ((~~on the design heating day~~)) when the outside temperature is 24°F.

Exceptions: Space heating systems are not required for:

1. Interior spaces where the primary purpose of the space is not associated with human comfort.
2. Group F, H, S or U occupancies.
3. Group R-1 occupancies not more than 500 square feet (139 m^2) in area.

See the *International Energy Conservation Code* and *International Mechanical Code* for additional requirements for heating systems.

[W] 1203.2 Use of solid-fuel-burning devices.

1203.2.1 Definitions. For the purposes of this section only, the following definitions apply.

DESIGNATED AREAS. Those areas designated by a county to be an urban growth area in Chapter 36.70A RCW and those areas designated by the U.S. Environmental Protection Agency as being in nonattainment for particulate matter.

SUBSTANTIALLY REMODELED. Any alteration or restoration of a building exceeding 60 percent of the appraised value of such building within a 12-month period. For the purpose of this section, the appraised value is the estimated cost to replace the building and structure in kind, based on current replacement costs.

1203.2.2 Primary heating source. Primary heating sources in all new and substantially remodeled buildings in designated areas shall not be dependent upon wood stoves.

1203.2.3 Solid fuel burning devices. No new or used solid fuel burning device shall be installed in new or *existing buildings* unless such device is United States Environmental Protection Agency certified or exempt from certification by the United States Environmental Protection Agency and conforms with RCW 70.94.011, 70.94.450, 70.94.453 and 70.94.457.

Exceptions:

1. Wood cook stoves.
2. Antique wood heaters manufactured prior to 1940.

SECTION 1204
LIGHTING

1204.1 General. Every space intended for human occupancy shall be provided with natural light by means of exterior glazed openings in accordance with Section 1204.2 or shall be provided with artificial light in accordance with Section 1204.3. Exterior glazed openings shall open directly onto a *public way* or onto a *yard* or *court* in accordance with Section 1205.

1204.2 Natural light. The minimum net glazed area shall be not less than 8 percent of the floor area of the room served.

1204.2.1 Adjoining spaces. For the purpose of natural lighting, any room is permitted to be considered as a portion of an adjoining room where one-half of the area of the common wall is open and unobstructed and provides an opening of not less than one-tenth of the floor area of the interior room or 25 square feet (2.32 m^2), whichever is greater.

Exception: Openings required for natural light shall be permitted to open into a sunroom with *thermal isolation* or a patio cover where the common wall provides a glazed area of not less than one-tenth of the floor area of the interior room or 20 square feet (1.86 m^2), whichever is greater.

1204.2.2 Exterior openings. Exterior openings required by Section 1204.2 for natural light shall open directly onto a *public way*, *yard* or *court*, as set forth in Section 1205.

Exceptions:

1. Required exterior openings are permitted to open into a roofed porch where the porch meets all of the following criteria:
   - 1.1. Abuts a *public way*, *yard* or *court*.
   - 1.2. Has a ceiling height of not less than 7 feet (2134 mm).
   - 1.3. Has a longer side at least 65 percent open and unobstructed.
2. Skylights are not required to open directly onto a *public way*, *yard* or *court*.

1204.3 Artificial light. Artificial light shall be provided that is adequate to provide an average illumination of 10 footcandles (107 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.

[S] 1204.4 Stairway illumination. *Stairways* within *dwelling units* and *exterior stairways* serving a *dwelling unit* shall have an illumination level on tread runs of not less than 1 footcandle (11 lux). *Stairways* in other occupancies shall be governed by Chapter 10.

1204.4.1 Controls. The control for activation of the required *stairway* lighting shall be in accordance with ((~~NFPA 70~~)) the *Seattle Electrical Code* and the *International Energy Conservation Code*.

1204.5 Emergency egress lighting. The *means of egress* shall be illuminated in accordance with Section 1008.1.

SECTION 1205
YARDS OR COURTS

1205.1 General. This section shall apply to *yards* and *courts* adjacent to exterior openings that provide natural light or ventilation. Such *yards* and *courts* shall be on the same *lot* as the building.

1205.2 Yards. *Yards* shall be not less than 3 feet (914 mm) in width for buildings two *stories* or less above *grade plane*. For buildings more than two *stories above grade plane*, the minimum width of the *yard* shall be increased at the rate of 1 foot (305 mm) for each additional *story*. For buildings exceeding 14 *stories above grade plane*, the required width of the *yard* shall be computed on the basis of 14 *stories above grade plane*.

1205.3 Courts. *Courts* shall be not less than 3 feet (914 mm) in width. *Courts* having windows opening on opposite sides shall be not less than 6 feet (1829 mm) in width. *Courts* shall be not less than 10 feet (3048 mm) in length unless bounded on one end by a *public way* or *yard*. For buildings more than two *stories above grade plane*, the *court* shall be increased 1 foot (305 mm) in width and 2 feet (610 mm) in length for each additional *story*. For buildings exceeding 14 *stories above grade plane*, the required dimensions shall be computed on the basis of 14 *stories above grade plane*.

1205.3.1 Court access. Access shall be provided to the bottom of *courts* for cleaning purposes.

1205.3.2 Air intake. *Courts* more than two *stories* in height shall be provided with a horizontal air intake at the bottom not less than 10 square feet (0.93 m^2) in area and leading to the exterior of the building unless abutting a *yard* or *public way*.

[S] 1205.3.3 Court drainage. The bottom of every *court* shall be properly graded and drained to a public sewer or other *approved* disposal system complying with the ((~~*International*~~)) *Uniform Plumbing Code*.

SECTION 1206
SOUND TRANSMISSION

[W] 1206.1 Scope. This section shall apply to common interior walls, partitions and floor/ceiling assemblies between adjacent *dwelling units* and *sleeping units* or between *dwelling units* and *sleeping units* and adjacent public areas. ((~~such as halls, *corridors, stairways* or *service areas.*~~))

[S] 1206.2 Airborne sound. Walls, partitions and floor-ceiling assemblies separating *dwelling units* and *sleeping units* from each other or from public or service areas shall have a sound transmission class of not less than 50, or not less than 45 if field tested, for airborne noise where tested in accordance with ASTM E90. Alternatively, the sound transmission class of walls, partitions and floor-ceiling assemblies shall be established by engineering analysis based on a comparison of walls, partitions and floor-ceiling assemblies having sound transmission class ratings as determined by the test procedures set forth in ASTM E90. Penetrations or openings in construction assemblies for piping; electrical devices; recessed cabinets; bathtubs; soffits; or heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings. ((~~This requirement shall not apply to entrance doors; however, such doors shall be tight fitting to the frame and sill.~~))

Exception: *Dwelling unit* or guest room entrance doors from interior corridors and interconnecting doors between separate units shall have perimeter seals. Such door assemblies shall have a sound transmission class (STC) rating of not less than 28.

1206.2.1 Masonry. The sound transmission class of concrete masonry and clay masonry assemblies shall be calculated in accordance with TMS 0302 or determined through testing in accordance with ASTM E90.

[S] 1206.3 Structure-borne sound. Floor-ceiling assemblies between *dwelling units* and *sleeping units* or between a *dwelling unit* or *sleeping unit* and a public or service area within the structure shall have an impact insulation class rating of not less than 50, or not less than 45 if field tested, where tested in accordance with ASTM E492. Alternatively, the impact insulation class of floor-ceiling assemblies shall be established by engineering analysis based on a comparison of floor-ceiling assemblies having impact insulation class ratings as determined by the test procedures in ASTM E492.

Exception: Floor assemblies in the bathrooms of Group R-1 occupancies are not required to meet the impact insulation class of 50 where structural concrete floor systems are used.

Joints in the perimeter of the separating wall or floor-ceiling assemblies shall be acoustically sealed with a permanent resilient material *approved* for the purpose. The separating wall or floor-ceiling assembly shall extend completely to and be sealed to another separating assembly or an exterior wall, roof or floor assembly.

Conduits, ducts, pipes and vents within the wall or floor-ceiling assemblies causing vibration shall be reasonably isolated from the building construction at points of support by means of resilient sleeves, mounts or underlayments. All other openings through which such conduits, ducts, pipes or vents pass shall have the excess opening fully sealed with insulative and permanently resilient materials *approved* for the purpose.

Electrical outlet boxes shall not be placed back-to-back and shall be offset by not less than 12 inches (305 mm) from outlets in the opposite wall surface. The back and sides of boxes shall be sealed with one-eighth-inch resilient sealant and backed by a minimum of 2-inch (51 mm) thick material fiber insulation or *approved* equivalent.

Metal ventilating and conditioned air ducts which pass between dwelling units shall be fabricated and installed to maintain required sound transmission ratings.

[S] 1206.4 Tested assemblies. Field- or laboratory-tested wall or floor-ceiling designs having an STC or IIC of 50 or more are permitted to be used without additional field testing when, in the opinion of the *building official*, the tested design has not been compromised by flanking paths. The *building official* is permitted to require tests when evidence of compromised separations is noted.

[S] 1206.5 Field testing and certification. Field testing, when permitted to determine airborne sound transmission or impact sound insulation class, shall be done in accordance with ASTM E 336 or ASTM E 492 under the supervision of an acoustical professional who is experienced in the field of acoustical testing and engineering and who shall forward certified test results to the building official that minimum sound insulation requirements stated above have been met.

[S] 1206.6 Mechanical equipment spaces. Spaces or shafts containing air conditioning, refrigeration or ventilating equipment, elevator machinery, or other mechanical equipment shall be separated both vertically and horizontally from adjoining dwelling units or guest rooms by construction designed to provide a minimum STC rating of 50.

[S] 1206.7 Sound transmission control systems. Generic systems as listed in GA 600 shall be accepted where a laboratory test indicates that the requirements of Section 1206 are met by the system.

Note: Design and materials for sound transmission control shall not impair the fire-resistive integrity of separating walls or floor-ceiling assemblies required to be of fire-resistive construction.

SECTION 1207
INTERIOR SPACE DIMENSIONS

Interpretation I1207: The required habitable space and minimum dimensions shall not include built-in equipment such as wardrobes, cabinets, or fixtures.

1207.1 Minimum room widths. *Habitable spaces*, other than a kitchen, shall be not less than 7 feet (2134 mm) in any plan dimension. Kitchens shall have a clear passageway of not less than 3 feet (914 mm) between counter fronts and appliances or counter fronts and walls.

[S] 1207.2 Minimum ceiling heights. Occupiable spaces, *habitable spaces* and *corridors* shall have a ceiling height of not less than 7 feet 6 inches (2286 mm) above the finished floor. Bathrooms, toilet rooms, kitchens, storage rooms and laundry rooms shall have a ceiling height of not less than 7 feet (2134 mm) above the finished floor.

Exceptions:

1. In one- and two-family *dwellings*, beams or girders spaced not less than 4 feet (1219 mm) on center shall be permitted to project not more than 6 inches (152 mm) below the required ceiling height.
2. If any room in a building has a sloped ceiling, the prescribed ceiling height for the room is required in one-half the area thereof. Any portion of the room measuring less than 5 feet (1524 mm) from the finished floor to the ceiling shall not be included in any computation of the minimum area thereof.
3. The height of *mezzanines* and spaces below *mezzanines* shall be in accordance with Section 505.2.
4. Corridors contained within a *dwelling unit* or *sleeping unit* in a Group R occupancy shall have a ceiling height of not less than 7 feet (2134 mm) above the finished floor.
5. Ceiling height in the means of egress shall comply with Section 1003.2.

Notwithstanding the exceptions to Section 1207.2, protruding objects in circulation routes in spaces required to be accessible shall comply with Chapter 11 and ANSI A117.1 Section 307.

1207.2.1 Furred ceiling. Any room with a furred ceiling shall be required to have the minimum ceiling height in two-thirds of the area thereof, but in no case shall the height of the furred ceiling be less than 7 feet (2134 mm).

[S] 1207.3 Dwelling unit size. *Dwelling units* shall have a minimum of 190 square feet (17.7 m^2) of *habitable space* or shall comply with rules promulgated by the building official.

[S] ((~~1207.3~~)) 1207.4 Room area. Every *dwelling unit* shall have not less than one room that shall have not less than 120 square feet (11.2 m^2) of *net floor area*. ((~~Other~~)) Sleeping units and other habitable rooms of a dwelling unit shall have a *net floor area* of not less than 70 square feet (6.5 m^2).

Exception: Kitchens are not required to be of a minimum floor area.

[W] ((~~1207.4~~)) 1207.5 Efficiency dwelling units. An efficiency ((~~living~~)) dwelling unit shall conform to the requirements of the code except as modified herein:

1. The unit ((~~shall have a living room of not less than 220 square feet (20.4 m^2) of floor area~~)) *habitable space* shall comply with Sections 1207.1 through 1207.4. ((~~An additional 100 square feet (9.3 m^2) of floor area shall be provided for each occupant of such unit in excess of two.~~))
2. The unit shall be provided with a separate closet.
3. The unit shall be provided with a kitchen sink, cooking appliance and refrigeration facilities, each having a clear working space of not less than 30 inches (762 mm) in front. Light and *ventilation* conforming to this code shall be provided.
4. The unit shall be provided with a separate bathroom containing a water closet, lavatory and bathtub or shower.

SECTION 1208
ACCESS TO UNOCCUPIED SPACES

1208.1 Crawl spaces. Crawl spaces shall be provided with not less than one access opening that shall be not less than 18 inches by 24 inches (457 mm by 610 mm).

1208.2 Attic spaces. An opening not less than 20 inches by 30 inches (559 mm by 762 mm) shall be provided to any *attic* area having a clear height of over 30 inches (762 mm). Clear headroom of not less than 30 inches (762 mm) shall be provided in the *attic* space at or above the access opening.

1208.3 Mechanical appliances. Access to mechanical appliances installed in under-floor areas, in *attic* spaces and on roofs or elevated structures shall be in accordance with the *International Mechanical Code*.

SECTION 1209
TOILET AND BATHROOM REQUIREMENTS

[P] 1209.1 Required fixtures. The number and type of plumbing fixtures provided in any occupancy shall comply with Chapter 29.

1209.2 Finish materials. Walls, floors and partitions in toilet and bathrooms shall comply with Sections 1209.2.1 through 1209.2.4.

1209.2.1 Floors and wall bases. In other than *dwelling units*, toilet, bathing and shower room floor finish materials shall have a smooth, hard, nonabsorbent surface. The intersections of such floors with walls shall have a smooth, hard, nonabsorbent vertical base that extends upward onto the walls not less than 4 inches (102 mm).

1209.2.2 Walls and partitions. Walls and partitions within 2 feet (610 mm) of service sinks, urinals and water closets shall have a smooth, hard, nonabsorbent surface, to a height of not less than 4 feet (1219 mm) above the floor, and except for structural elements, the materials used in such walls shall be of a type that is not adversely affected by moisture.

Exception: This section does not apply to the following buildings and spaces:

1. Dwelling units and sleeping units.
2. Toilet rooms that are not accessible to the public and that have not more than one water closet.

Accessories such as grab bars, towel bars, paper dispensers and soap dishes, provided on or within walls, shall be installed and sealed to protect structural elements from moisture.

1209.2.3 Showers. Shower compartments and walls above bathtubs with installed shower heads shall be finished with a smooth, nonabsorbent surface to a height not less than 72 inches (1829 mm) above the drain inlet.

1209.2.4 Waterproof joints. Built-in tubs with showers shall have waterproof joints between the tub and adjacent wall.

[P] 1209.3 Privacy. Privacy at water closets and urinals shall be provided in accordance with Sections 1209.3.1 and 1209.3.2.

[W][P] 1209.3.1 Water closet compartment. Each water closet utilized by the public or employees shall occupy a separate compartment with walls or partitions and a door enclosing the fixtures to ensure privacy. Gender-neutral toilet room water closet compartments shall be in accordance with Section 2902.2.2.

Exceptions:

1. Water closet compartments shall not be required in a single-occupant toilet room with a lockable door.
2. Toilet rooms located in child day care facilities and containing two or more water closets shall be permitted to have one water closet without an enclosing compartment.
3. This provision is not applicable to toilet areas located within Group I-3 occupancy housing areas.

[W][P] 1209.3.2 Urinal partitions. Each urinal utilized by the public or employees shall occupy a separate area with walls or partitions to provide privacy. The walls or partitions shall begin at a height not more than 12 inches (305 mm) from and extend not less than 60 inches (1524 mm) above the finished floor surface. The walls or partitions shall extend from the wall surface at each side of the urinal not less than 18 inches (457 mm) or to a point not less than 6 inches (152 mm) beyond the outermost front lip of the urinal measured from the finished backwall surface, whichever is greater.

Exceptions:

1. Urinal partitions shall not be required in a single-occupant or family or assisted-use toilet room with a lockable door.
2. Toilet rooms located in child day care facilities and containing two or more urinals shall be permitted to have one urinal without partitions.
3. Urinals located in gender-neutral toilet facilities shall be in accordance with Section 2902.2.2.

CHAPTER 14

EXTERIOR WALLS

User notes:

About this chapter: *Chapter 14 addresses requirements for exterior walls of buildings. Minimum standards for wall covering materials, such as material performance and fire resistance, installation of wall coverings and the ability of the wall to provide weather protection are provided. This chapter also contains limitations on the areas and heights of combustible wall coverings based on fire separation distances, radiant heat exposure and surface burning characteristics.*

Code development reminder: *Code change proposals to sections preceded by the designation [BS] will be considered by the IBC—Structural Code Development Committee during the 2019 (Group B) Code Development Cycle. See explanation on page iv.*

SECTION 1401
GENERAL

1401.1 Scope. The provisions of this chapter shall establish the minimum requirements for *exterior walls*; *exterior wall coverings*; *exterior wall* openings; exterior windows and doors; and architectural *trim*.

SECTION 1402
PERFORMANCE REQUIREMENTS

1402.1 General. The provisions of this section shall apply to *exterior walls*, wall coverings and components thereof.

[W][S] 1402.2 Weather protection. *Exterior walls* shall provide the building with a weather-resistant *exterior wall envelope*. The *exterior wall envelope* shall include flashing, as described in Section 1404.4. The *exterior wall envelope* shall be designed and constructed in such a manner as to prevent the accumulation of water within the wall assembly by providing a *water-resistive barrier* behind the exterior veneer, as described in Section 1403.2, and a means for draining water that enters the assembly to the exterior. ((~~Protection against condensation in the *exterior wall* assembly shall be provided in accordance with Section 1404.3.~~)) An air space cavity is not required under the exterior cladding for an exterior wall clad with lapped or panel siding made of plywood, engineered wood, hardboard, or fiber cement. Protection against condensation in the exterior wall assembly shall be provided in accordance with Section 1404.3.

Exceptions:

1. A weather-resistant *exterior wall envelope* shall not be required over concrete or masonry walls designed in accordance with Chapters 19 and 21, respectively.
2. Compliance with the requirements for a means of drainage, and the requirements of Sections 1403.2 and 1404.4, shall not be required for an *exterior wall envelope* that has been demonstrated through testing to resist wind-driven rain, including joints, penetrations and intersections with dissimilar materials, in accordance with ASTM E331 under the following conditions:
   - 2.1. *Exterior wall envelope* test assemblies shall include not fewer than one opening, one control joint, one wall/eave interface and one wall sill. Tested openings and penetrations shall be representative of the intended end-use configuration.
   - 2.2. *Exterior wall envelope* test assemblies shall be not less than 4 feet by 8 feet (1219 mm by 2438 mm) in size.
   - 2.3. *Exterior wall envelope* assemblies shall be tested at a minimum differential pressure of 6.24 pounds per square foot (psf) (0.297 kN/m^2).
   - 2.4. *Exterior wall envelope* assemblies shall be subjected to a minimum test exposure duration of 2 hours.

   The *exterior wall envelope* design shall be considered to resist wind-driven rain where the results of testing indicate that water did not penetrate control joints in the *exterior wall envelope*, joints at the perimeter of openings or intersections of terminations with dissimilar materials.
3. *Exterior insulation and finish systems* (EIFS) complying with Section 1407.4.1.

Interpretation I1402.2: According to Section 1402.2, a rain screen or similar construction method is not required for most exterior siding and cladding, and single-wall construction is allowed. Drainage methods should conform to the manufacturer's installation instructions and other sections of the code.

Note: The "water-resistive barrier" behind the exterior wall covering provides "drainage" of the water that may enter an exterior wall envelope. If water penetrates the exterior wall covering, the felt paper or other *approved* material will direct the water to the bottom of the wall where it will escape to the exterior.

[BS] 1402.3 Structural. *Exterior walls*, and the associated openings, shall be designed and constructed to resist safely the superimposed loads required by Chapter 16.

1402.4 Fire resistance. *Exterior walls* shall be fire-resistance rated as required by other sections of this code with opening protection as required by Chapter 7.

[S] ((~~1402.5 Vertical and lateral flame propagation.~~ ~~*Exterior walls* on buildings of Type I, II, III or IV construction that are greater than 40 feet (12 192 mm) in height above grade plane and contain a combustible *water-resistive barrier* shall be tested in accordance with and comply with the acceptance criteria of NFPA 285. For the purposes of this section, *fenestration* products, flashing of *fenestration* products and *water-resistive barrier* flashing and accessories at other locations, including through wall flashings, shall not be considered part of the *water-resistive barrier*.~~

~~**Exceptions:**~~

1. ~~Walls in which the *water-resistive barrier* is the only combustible component and the *exterior wall* has a wall covering of brick, concrete, stone, terra cotta, stucco or steel with minimum thicknesses in accordance with Table 1404.2.~~
2. ~~Walls in which the *water-resistive barrier* is the only combustible component and the *water-resistive barrier* has a peak heat release rate of less than 150 kW/m^2, a total heat release of less than 20 MJ/m^2 and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354 and has a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m^2.~~))

[BS] 1402.6 Flood resistance. For buildings in flood hazard areas as established in Section 1612.3, *exterior walls* extending below the elevation required by Section 1612 shall be constructed with flood-damage-resistant materials.

[BS] 1402.7 Flood resistance for coastal high-hazard areas and coastal A zones. For buildings in coastal high-hazard areas and coastal A zones as established in Section 1612.3, electrical, mechanical and plumbing system components shall not be mounted on or penetrate through *exterior walls* that are designed to break away under flood loads.

SECTION 1403
MATERIALS

1403.1 General. Materials used for the construction of *exterior walls* shall comply with the provisions of this section. Materials not prescribed herein shall be permitted, provided that any such alternative has been *approved*.

1403.2 Water-resistive barrier. Not fewer than one layer of No.15 asphalt felt, complying with ASTM D226 for Type 1 felt or other *approved* materials, shall be attached to the studs or sheathing, with flashing as described in Section 1404.4, in such a manner as to provide a continuous *water-resistive barrier* behind the *exterior wall* veneer.

[BS] 1403.3 Wood. *Exterior walls* of wood construction shall be designed and constructed in accordance with Chapter 23.

[BS] 1403.3.1 Basic hardboard. Basic hardboard shall conform to the requirements of ANSI A135.4.

[BS] 1403.3.2 Hardboard siding. Hardboard siding shall conform to the requirements of ANSI A135.6 and, where used structurally, shall be so identified by the *label* of an *approved* agency.

[BS] 1403.4 Masonry. *Exterior walls* of masonry construction shall be designed and constructed in accordance with this section and Chapter 21. Masonry units, mortar and metal accessories used in anchored and adhered veneer shall meet the physical requirements of Chapter 21. The backing of anchored and adhered veneer shall be of concrete, masonry, steel framing or wood framing. Continuous insulation meeting the applicable requirements of this code shall be permitted between the backing and the masonry veneer.

[BS] 1403.5 Metal. *Exterior walls* constructed of cold-formed steel, structural steel or aluminum shall be designed in accordance with Chapters 22 and 20, respectively.

[BS] 1403.5.1 Aluminum siding. Aluminum siding shall conform to the requirements of AAMA 1402.

[BS] 1403.5.2 Cold-rolled copper. Copper shall conform to the requirements of ASTM B370.

[BS] 1403.5.3 Lead-coated copper. Lead-coated copper shall conform to the requirements of ASTM B101.

[BS] 1403.6 Concrete. *Exterior walls* of concrete construction shall be designed and constructed in accordance with Chapter 19.

[BS] 1403.7 Glass-unit masonry. *Exterior walls* of glass-unit masonry shall be designed and constructed in accordance with Chapter 21.

1404.3 Vapor retarders. Vapor retarders as described in Section 1404.3.3 shall be provided in accordance with Sections 1404.3.1 and 1404.3.2, or an approved design using accepted engineering practice for hygrothermal analysis.

[S] 1404.3.1 Class I and II vapor retarders. ((~~Class I and II vapor retarders shall not be provided on the interior side of frame walls in Zones 1 and 2. Class I vapor retarders shall not be provided on the interior side of frame walls in Zones 3 and 4 other than Marine 4.~~)) Class I or II vapor retarders shall be provided on the interior side of frame walls. ((~~in Zones 5, 6, 7, 8 and Marine 4. The appropriate zone shall be selected in accordance with Chapter 3 [CE] of the *International Energy Conservation Code-Commercial Provisions*.~~))

Exceptions:

1. Basement walls.
2. Below-grade portion of any wall.
3. Construction where moisture or its freezing will not damage the materials.
4. Conditions where Class III vapor retarders are required in Section 1404.3.2.

1404.3.2 Class III vapor retarders. Class III vapor retarders shall be permitted where any one of the conditions in Table 1404.3.2 is met. Only Class III vapor retarders shall be used on the interior side of frame walls where foam plastic insulating sheathing with a perm rating of less than 1 is applied in accordance with Table 1404.3.2 on the exterior side of the frame wall.

[S] TABLE 1404.3.2
CLASS III VAPOR RETARDERS

ZONE	CLASS III VAPOR RETARDERS PERMITTED FOR:[a]
Marine 4	Vented cladding over wood structural panels Vented cladding over fiberboard Vented cladding over gypsum Continuous insulation with *R*-value ≥ R2.5 over 2 × 4 wall Continuous insulation with *R*-value ≥ R3.75 over 2 × 6 wall
((~~5~~	~~Vented cladding over wood structural panels~~ ~~Vented cladding over fiberboard~~ ~~Vented cladding over gypsum~~ ~~Continuous insulation with *R*-value ≥ R5 over 2 × 4 wall~~ ~~Continuous insulation with *R*-value ≥ R7.5 over 2 × 6 wall~~
~~6~~	~~Vented cladding over fiberboard~~ ~~Vented cladding over gypsum~~ ~~Continuous insulation with *R*-value ≥ R7.5 over 2 × 4 wall~~ ~~Continuous insulation with *R*-value ≥ R11.25 over 2 × 6 wall~~
~~7 and 8~~	~~Continuous insulation with *R*-value ≥ R10 over 2 × 4 wall~~ ~~Continuous insulation with *R*-value ≥ R15 over 2 × 6 wall~~))

a. Spray foam with a maximum permanence of 1.5 perms at the installed thickness applied to the interior cavity side of wood structural panels, fiberboard, insulating sheathing or gypsum is deemed to meet the continuous insulation requirement where the spray foam *R*-value meets or exceeds the specified insulating sheathing *R*-value.

1404.3.3 Material vapor retarder class. The *vapor retarder class* shall be based on the manufacturer's certified testing or a tested assembly.

The following shall be deemed to meet the class specified:

Class I: Sheet polyethylene, nonperforated aluminum foil with a perm rating of less than or equal to 0.1.

Class II: Kraft-faced fiberglass batts or paint with a perm rating greater than 0.1 and less than or equal to 1.0.

Class III: Latex or enamel paint with a perm rating of greater than 1.0 and less than or equal to 10.0.

Note: Minimum perm ratings for vapor retarders are specified in the definition of "vapor retarder class" in chapter 2.

1404.3.4 Minimum clear airspaces and vented openings for vented cladding. For the purposes of this section, vented cladding shall include the following minimum clear airspaces:

1. Vinyl, polypropylene or horizontal aluminum siding applied over a weather-resistive barrier as specified in this chapter.
2. Brick veneer with a clear airspace as specified in this code.
3. Other *approved* vented claddings.

1406.14 Labeling. MCM shall be labeled in accordance with Section 1703.5.

SECTION 1407
EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS)

1407.1 General. The provisions of this section shall govern the materials, construction and quality of *exterior insulation and finish systems* (EIFS) for use as *exterior wall coverings* in addition to other applicable requirements of Chapters 7, 14, 16, 17 and 26.

1407.2 Performance characteristics. EIFS shall be constructed such that it meets the performance characteristics required in ASTM E2568.

[BS] 1407.3 Structural design. The underlying structural framing and substrate shall be designed and constructed to resist loads as required by Chapter 16.

1407.4 Weather resistance. EIFS shall comply with Section 1402 and shall be designed and constructed to resist wind and rain in accordance with this section and the manufacturer's application instructions.

1407.4.1 EIFS with drainage. EIFS with drainage shall have an average minimum drainage efficiency of 90 percent when tested in accordance the requirements of ASTM E2273 and is required on framed walls of Type V construction, Group R1, R2, R3 and R4 occupancies.

1407.4.1.1 Water-resistive barrier. For EIFS with drainage, the *water-resistive barrier* shall comply with Section 1403.2 or ASTM E2570.

1407.5 Installation. Installation of the EIFS and EIFS with drainage shall be in accordance with the EIFS manufacturer's instructions.

[S] ((~~1407.6 Special inspections.~~ ~~EIFS installations shall comply with the provisions of Sections 1704.2 and 1705.16.~~))

SECTION 1408
HIGH-PRESSURE DECORATIVE EXTERIOR-GRADE COMPACT LAMINATES (HPL)

1408.1 General. The provisions of this section shall govern the materials, construction and quality of High-Pressure Decorative *Exterior-Grade Compact Laminates (HPL)* for use as *exterior wall coverings* in addition to other applicable requirements of Chapters 14 and 16.

1408.2 Exterior wall finish. HPL used as *exterior wall covering* or as elements of balconies and similar projections and bay and oriel windows to provide cladding or weather resistance shall comply with Sections 1408.4 through 1408.14.

1408.3 Architectural trim and embellishments. HPL used as architectural trim or embellishments shall comply with Sections 1408.7 through 1408.14.

[BS] 1408.4 Structural design. HPL systems shall be designed and constructed to resist wind loads as required by Chapter 16 for components and cladding.

1408.5 Approval. Results of approved tests or an engineering analysis shall be submitted to the building official to verify compliance with the requirements of Chapter 16 for wind loads.

1408.6 Weather resistance. HPL systems shall comply with Section 1402 and shall be designed and constructed to resist wind and rain in accordance with this section and the manufacturer's instructions.

1408.7 Durability. HPL systems shall be constructed of approved materials that maintain the performance characteristics required in Section 1408 for the duration of use.

1408.8 Fire-resistance rating. Where HPL systems are used on *exterior walls* required to have a *fire-resistance rating* in accordance with Section 705, evidence shall be submitted to the building official that the required *fire-resistance rating* is maintained.

Exception: HPL systems not containing foam plastic insulation, which are installed on the outer surface of a fire-resistance-rated *exterior wall* in a manner such that the attachments do not penetrate through the entire *exterior wall* assembly, shall not be required to comply with this section.

1408.9 Surface-burning characteristics. Unless otherwise specified, HPL shall have a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in the minimum and maximum thicknesses intended for use in accordance with ASTM E84 or UL 723.

1408.10 Type I, II, III and IV construction. Where installed on buildings of Type I, II, III and IV construction, HPL systems shall comply with Sections 1408.10.1 through 1408.10.4, or Section 1408.11.

SECTION 1505
FIRE CLASSIFICATION

[BF] 1505.1 General. Roof assemblies shall be divided into the classes defined in this section. Class A, B and C roof assemblies and roof coverings required to be listed by this section shall be tested in accordance with ASTM E108 or UL 790. In addition, *fire-retardant-treated wood* roof coverings shall be tested in accordance with ASTM D2898. The minimum roof coverings installed on buildings shall comply with Table 1505.1 based on the type of construction of the building.

Exception: Skylights and sloped glazing that comply with Chapter 24 or Section 2610.

[BF] 1505.2 Class A roof assemblies. Class A roof assemblies are those that are effective against severe fire test exposure. Class A roof assemblies and roof coverings shall be *listed* and identified as Class A by an *approved* testing agency. Class A roof assemblies shall be permitted for use in buildings or structures of all types of construction.

Exceptions:

1. Class A roof assemblies include those with coverings of brick, masonry or an exposed concrete roof deck.
2. Class A roof assemblies also include ferrous or copper shingles or sheets, metal sheets and shingles, clay or concrete roof tile or slate installed on noncombustible decks or ferrous, copper or metal sheets installed without a roof deck on noncombustible framing.
3. Class A roof assemblies include minimum 16 ounce per square foot (0.0416 kg/m^2) copper sheets installed over combustible decks.
4. Class A roof assemblies include slate installed over ASTM D226, Type II underlayment over combustible decks.

[S] TABLE 1505.1[a, b]
MINIMUM ROOF COVERING CLASSIFICATION FOR TYPES OF CONSTRUCTION

IA	IB	IIA	IIB	IIIA	IIIB	IV	VA	VB
B	B	B	C[c]	B	C[c]	B	B	C[c]

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2.

((~~a. Unless otherwise required in accordance with the *International Wildland-Urban Interface Code* or due to the location of the building within a fire district in accordance with Appendix D.~~

~~b~~)) a. Nonclassified roof coverings shall be permitted on buildings of Group R-3 and Group U occupancies, where there is a minimum fire-separation distance of 6 feet measured from the leading edge of the roof.

((~~c~~)) b. Buildings that are not more than two stories above grade plane and having not more than 6,000 square feet of projected roof area and where there is a minimum 10-foot fire-separation distance from the leading edge of the roof to a lot line on all sides of the building, except for street fronts or public ways, shall be permitted to have roofs of No. 1 cedar or redwood shakes and No. 1 shingles constructed in accordance with Section 1505.7.

[BF] 1505.3 Class B roof assemblies. Class B roof assemblies are those that are effective against moderate fire-test exposure. Class B roof assemblies and roof coverings shall be *listed* and identified as Class B by an *approved* testing agency.

[BF] 1505.4 Class C roof assemblies. Class C roof assemblies are those that are effective against light fire-test exposure. Class C roof assemblies and roof coverings shall be *listed* and identified as Class C by an *approved* testing agency.

[BF] 1505.5 Nonclassified roofing. Nonclassified roofing is *approved* material that is not *listed* as a Class A, B or C roof covering.

[BF] 1505.6 Fire-retardant-treated wood shingles and shakes. *Fire-retardant-treated wood* shakes and shingles shall be treated by impregnation with chemicals by the full-cell vacuum-pressure process, in accordance with AWPA C1. Each bundle shall be marked to identify the manufactured unit and the manufacturer, and shall be *labeled* to identify the classification of the material in accordance with the testing required in Section 1505.1, the treating company and the quality control agency.

[BF] 1505.7 Special purpose roofs. Special purpose wood shingle or wood shake roofing shall conform to the grading and application requirements of Section 1507.8 or 1507.9. In addition, an underlayment of 5/8-inch (15.9 mm) Type X water-resistant gypsum backing board or gypsum sheathing shall be placed under minimum nominal 1/2-inch-thick (12.7 mm) wood structural panel solid sheathing or 1-inch (25 mm) nominal spaced sheathing.

[BF] 1505.8 Building-integrated photovoltaic products. *Building-integrated photovoltaic products* installed as the roof covering shall be tested, *listed* and *labeled* for fire classification in accordance with Section 1505.1.

[BF] 1505.9 Rooftop mounted photovoltaic panel systems. Rooftop rack-mounted *photovoltaic panel systems* shall be tested, *listed* and identified with a fire classification in accordance with UL 1703 and UL 2703. The fire classification shall comply with Table 1505.1 based on the type of construction of the building.

[BF] 1505.10 Roof gardens and landscaped roofs. Roof gardens and landscaped roofs shall comply with Section 1505.1 and 1507.16 and shall be installed in accordance with ANSI/SPRI VF-1.

[BF] TABLE 1508.2
MATERIAL STANDARDS FOR ROOF INSULATION

Cellular glass board	ASTM C552
Composite boards	ASTM C1289, Type III, IV, V or VII
Expanded polystyrene	ASTM C578
Extruded polystyrene	ASTM C578
Fiber-reinforced gypsum board	ASTM C1278
Glass-faced gypsum board	ASTM C1177
High-density polyisocyanurate board	ASTM C1289, Type II, Class 4
Mineral fiber insulation board	ASTM C726
Perlite board	ASTM C728
Polyisocyanurate board	ASTM C1289, Type I or II
Wood fiberboard	ASTM C208, Type II

SECTION 1509
RADIANT BARRIERS INSTALLED ABOVE DECK

[BF] 1509.1 General. A *radiant barrier* installed above a deck shall comply with Sections 1509.2 through 1509.4.

[BF] 1509.2 Fire testing. *Radiant barriers* shall be permitted for use above decks where the *radiant barrier* is covered with an approved roof covering and the system consisting of the *radiant barrier* and the roof covering complies with the requirements of either FM 4450 or UL 1256.

[BF] 1509.3 Installation. The low emittance surface of the *radiant barrier* shall face the continuous airspace between the *radiant barrier* and the roof covering.

[BF] 1509.4 Material standards. A *radiant barrier* installed above a deck shall comply with ASTM C1313/1313M.

SECTION 1510
ROOFTOP STRUCTURES

[BG] 1510.1 General. The provisions of this section shall govern the construction of rooftop structures.

1510.1.1 Area limitation. The aggregate area of penthouses and other enclosed rooftop structures shall not exceed one-third the area of the supporting roof deck. Such penthouses and other enclosed rooftop structures shall not be required to be included in determining the building area or number of stories as regulated by Section 503.1. The area of such penthouses shall not be included in determining the fire area specified in Section 901.7.

[BG] 1510.2 Penthouses. Penthouses in compliance with Sections 1510.2.1 through 1510.2.4 shall be considered as a portion of the story directly below the roof deck on which such penthouses are located. Other penthouses shall be considered as an additional story of the building.

[BG] 1510.2.1 Height above roof deck. Penthouses constructed on buildings of other than Type I construction shall not exceed 18 feet (5486 mm) in height above the roof deck as measured to the average height of the roof of the penthouse. Penthouses located on the roof of buildings of Type I construction shall not be limited in height.

Exception: Where used to enclose tanks or elevators that travel to the roof level, penthouses shall be permitted to have a maximum height of 28 feet (8534 mm) above the roof deck.

[S][BG] 1510.2.2 Use limitations. Penthouses shall not be used for purposes other than the shelter of mechanical or electrical equipment, tanks, elevators and related machinery, exit stairways or vertical shaft openings in the roof assembly.

[BG] 1510.2.3 Weather protection. Provisions such as louvers, louver blades or flashing shall be made to protect the mechanical and electrical equipment and the building interior from the elements.

[BG] 1510.2.4 Type of construction. Penthouses shall be constructed with walls, floors and roofs as required for the type of construction of the building on which such penthouses are built.

Exceptions:

1. On buildings of Type I construction, the exterior walls and roofs of penthouses with a *fire separation distance* greater than 5 feet (1524 mm) and less than 20 feet (6096 mm) shall be permitted to have not less than a 1-hour fire-

[BG] 1510.6.2 Type I, II, III or IV construction. Regardless of the requirements in Section 1510.6, *mechanical equipment screens* that are located on the roof decks of buildings of Type I, II, III or IV construction shall be permitted to be constructed of combustible materials in accordance with any one of the following limitations:

1. The fire separation distance shall be not less than 20 feet (6096 mm) and the height of the *mechanical equipment screen* above the roof deck shall not exceed 4 feet (1219 mm) as measured to the highest point on the *mechanical equipment screen*.
2. The fire separation distance shall be not less than 20 feet (6096 mm) and the *mechanical equipment screen* shall be constructed of fire-retardant-treated wood complying with Section 2303.2 for exterior installation.
3. Where exterior wall covering panels are used, the panels shall have a flame spread index of 25 or less when tested in the minimum and maximum thicknesses intended for use, with each face tested independently in accordance with ASTM E84 or UL 723. The panels shall be tested in the minimum and maximum thicknesses intended for use in accordance with, and shall comply with the acceptance criteria of, NFPA 285 and shall be installed as tested. Where the panels are tested as part of an exterior wall assembly in accordance with NFPA 285, the panels shall be installed on the face of the *mechanical equipment screen* supporting structure in the same manner as they were installed on the tested exterior wall assembly.

[BG] 1510.6.3 Type V construction. The height of mechanical equipment screens located on the roof decks of buildings of Type V construction, as measured from grade plane to the highest point on the mechanical equipment screen, shall be permitted to exceed the maximum building height allowed for the building by other provisions of this code where complying with any one of the following limitations, provided that the fire separation distance is greater than 5 feet (1524 mm):

1. Where the fire separation distance is not less than 20 feet (6096 mm), the height above grade plane of the mechanical equipment screen shall not exceed 4 feet (1219 mm) more than the maximum building height allowed.
2. The *mechanical equipment screen* shall be constructed of noncombustible materials.
3. The *mechanical equipment screen* shall be constructed of fire-retardant-treated wood complying with Section 2303.2 for exterior installation.
4. Where the fire separation distance is not less than 20 feet (6096 mm), the *mechanical equipment screen* shall be constructed of materials having a flame spread index of 25 or less when tested in the minimum and maximum thicknesses intended for use with each face tested independently in accordance with ASTM E84 or UL 723.

[BG] 1510.7 Photovoltaic panels and modules. Rooftop-mounted *photovoltaic panels* and *modules* shall be designed in accordance with this section.

[BG] 1510.7.1 Fire classification. Rooftop-mounted *photovoltaic panels* and *modules* shall have the fire classification in accordance with Section 1505.9.

[BG] 1510.7.2 Photovoltaic panels and modules. Rooftop-mounted *photovoltaic panels* and *modules* shall be *listed* and labeled in accordance with UL 1703 and shall be installed in accordance with the manufacturer's instructions.

[BG] 1510.8 Other rooftop structures. Rooftop structures not regulated by Sections 1510.2 through 1510.7 shall comply with Sections 1510.8.1 through 1510.8.5, as applicable.

[BG] 1510.8.1 Aerial supports. Aerial supports shall be constructed of noncombustible materials.

Exception: Aerial supports not greater than 12 feet (3658 mm) in height as measured from the roof deck to the highest point on the aerial supports shall be permitted to be constructed of combustible materials.

[BG] 1510.8.2 Bulkheads. Bulkheads used for the shelter of mechanical or electrical equipment or vertical shaft openings in the roof assembly shall comply with Section 1510.2 as penthouses. Bulkheads used for any other purpose shall be considered as an additional story of the building.

[BG] 1510.8.3 Dormers. Dormers shall be of the same type of construction as required for the roof in which such dormers are located or the exterior walls of the building.

[BG] 1510.8.4 Fences. Fences and similar structures shall comply with Section 1510.6 as *mechanical equipment screens*.

[BG] 1510.8.5 Flagpoles. Flagpoles and similar structures shall not be required to be constructed of noncombustible materials and shall not be limited in height or number.

[S] ((~~[BG] 1510.9 Structural fire resistance.~~ ~~The structural frame and roof construction supporting loads imposed upon the roof by any rooftop structure shall comply with the requirements of Table 601. The fire-resistance reduction permitted by Table 601, Note a, shall not apply to roofs containing rooftop structures.~~))

SECTION 1511
REROOFING

Note: See International Energy Conservation Code for insulation requirements for reroofing.

1511.1 General. Materials and methods of application used for recovering or replacing an existing roof covering shall comply with the requirements of Chapter 15.

Exceptions:

1. *Roof replacement* or *roof recover* of existing low-slope roof coverings shall not be required to meet the minimum design slope requirement of one-quarter unit vertical in 12 units horizontal (2-percent slope) in Section 1507 for roofs that provide positive roof drainage.
2. Recovering or replacing an existing roof covering shall not be required to meet the requirement for secondary (emergency overflow) drains or scuppers in Section 1502.2 for roofs that provide for positive roof drainage. For the purposes of this exception, existing secondary drainage or scupper systems required in accordance with this code shall not be removed unless they are replaced by secondary drains or scuppers designed and installed in accordance with Section 1502.2.

1511.2 Structural and construction loads. Structural roof components shall be capable of supporting the roof-covering system and the material and equipment loads that will be encountered during installation of the system.

1511.3 Roof replacement. *Roof replacement* shall include the removal of all existing layers of roof coverings down to the roof deck.

Exception: Where the existing roof assembly includes an ice barrier membrane that is adhered to the roof deck, the existing ice barrier membrane shall be permitted to remain in place and covered with an additional layer of ice barrier membrane in accordance with Section 1507.

1511.3.1 Roof recover. The installation of a new roof covering over an existing roof covering shall be permitted where any of the following conditions occur:

1. Where the new roof covering is installed in accordance with the roof covering manufacturer's approved instructions.
2. Complete and separate roofing systems, such as standing-seam metal roof panel systems, that are designed to transmit the roof loads directly to the building's structural system and that do not rely on existing roofs and roof coverings for support, shall not require the removal of existing roof coverings.
3. Metal panel, metal shingle and concrete and clay tile roof coverings shall be permitted to be installed over existing wood shake roofs when applied in accordance with Section 1511.4.
4. The application of a new protective roof coating over an existing protective roof coating, metal roof panel, built-up roof, spray polyurethane foam roofing system, metal roof shingles, mineral-surfaced roll roofing, modified bitumen roofing or thermoset and thermoplastic single-ply roofing shall be permitted without tear off of existing roof coverings.

1511.3.1.1 Exceptions. A *roof recover* shall not be permitted where any of the following conditions occur:

1. Where the existing roof or roof covering is water soaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.
2. Where the existing roof covering is slate, clay, cement or asbestos-cement tile.
3. Where the existing roof has two or more applications of any type of roof covering.

1511.4 Roof recovering. Where the application of a new roof covering over wood shingle or shake roofs creates a combustible concealed space, the entire existing surface shall be covered with gypsum board, mineral fiber, glass fiber or other *approved* materials securely fastened in place.

1511.5 Reinstallation of materials. Existing slate, clay or cement tile shall be permitted for reinstallation, except that damaged, cracked or broken slate or tile shall not be reinstalled. Existing vent flashing, metal edgings, drain outlets, collars and metal counterflashings shall not be reinstalled where rusted, damaged or deteriorated. Aggregate surfacing materials shall not be reinstalled.

1511.6 Flashings. Flashings shall be reconstructed in accordance with *approved* manufacturer's installation instructions. Metal flashing to which bituminous materials are to be adhered shall be primed prior to installation.

SECTION 1512
PHOTOVOLTAIC PANELS AND MODULES

1512.1 Photovoltaic panels and modules. *Photovoltaic panels* and *modules* installed on a roof or as an integral part of a roof assembly shall comply with the requirements of this code and the *International Fire Code*.

CHAPTER 15

ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

User notes:

About this chapter: *Chapter 15 provides minimum requirements for the design and construction of roof assemblies and rooftop structures. The criteria address the weather-protective barrier at the roof and, in most circumstances, a fire-resistant barrier. The chapter is largely prescriptive in nature and is based on decades of experience with various traditional materials, but it also recognizes newer products such as photovoltaic shingles. Section 1510 addresses rooftop structures, which include penthouses, tanks, towers and spires. Rooftop penthouses larger than prescribed in this chapter must be treated as a story under Chapter 5.*

Code development reminder: *Code change proposals to sections preceded by the designation [BF], [BG] or [P] will be considered by one of the code development committees meeting during the 2018 (Group A) Code Development Cycle. All other code change proposals will be considered by the IBC—Structural Code Development Committee during the 2019 (Group B) Code Development Cycle. See explanation on page iv.*

SECTION 1501
GENERAL

1501.1 Scope. The provisions of this chapter shall govern the design, materials, construction and quality of roof assemblies, and rooftop structures.

SECTION 1502
ROOF DRAINAGE

[S][P] 1502.1 General. Design and installation of roof drainage systems shall comply with Section 1502 of this code and Sections 1106 and 1108, as applicable, of the ((~~*International*~~)) *Uniform Plumbing Code.*

[S][P] 1502.2 Secondary (emergency overflow) drains or scuppers. Where roof drains are required, secondary (emergency overflow) roof drains or scuppers shall be provided where the roof perimeter construction extends above the roof in such a manner that water will be entrapped if the primary drains allow buildup for any reason. The installation and sizing of secondary emergency overflow drains, leaders and conductors shall comply with Sections ((~~1106~~)) 1103 and ((~~1108~~)) 1105, as applicable, of the ((~~*International*~~)) *Uniform Plumbing Code.*

1502.3 Scuppers. Where scuppers are used for secondary (emergency overflow) roof drainage, the quantity, size, location and inlet elevation of the scuppers shall be sized to prevent the depth of ponding water from exceeding that for which the roof was designed as determined by Section 1611.1. Scuppers shall not have an opening dimension of less than 4 inches (102 mm). The flow through the primary system shall not be considered when locating and sizing scuppers.

1502.4 Gutters. Gutters and leaders placed on the outside of buildings, other than Group R-3, private garages and buildings of Type V construction, shall be of noncombustible material or not less than Schedule 40 plastic pipe.

SECTION 1503
WEATHER PROTECTION

1503.1 General. Roof decks shall be covered with *approved* roof coverings secured to the building or structure in accordance with the provisions of this chapter. Roof coverings shall be designed in accordance with this code, and installed in accordance with this code and the manufacturer's *approved* instructions.

1503.2 Flashing. Flashing shall be installed in such a manner so as to prevent water from entering the wall and roof through joints in copings, through moisture-permeable materials and at intersections with parapet walls and other penetrations through the roof plane.

1503.2.1 Locations. Flashing shall be installed at wall and roof intersections, at gutters, wherever there is a change in roof slope or direction and around roof openings. Where flashing is of metal, the metal shall be corrosion resistant with a thickness of not less than 0.019 inch (0.483 mm) (No. 26 galvanized sheet).

1503.3 Coping. Parapet walls shall be properly coped with noncombustible, weatherproof materials of a width not less than the thickness of the parapet wall.

1503.4 Attic and rafter ventilation. Intake and exhaust vents shall be provided in accordance with Section 1202.2 and the vent product manufacturer's installation instructions.

CHAPTER 16

STRUCTURAL DESIGN

User notes:

About this chapter: *Chapter 16 establishes minimum design requirements so that the structural components of buildings are proportioned to resist the loads that are likely to be encountered. In addition, this chapter assigns buildings and structures to risk categories that are indicative of their intended use. The loads specified herein along with the required load combinations have been established through research and service performance of buildings and structures. The application of these loads and adherence to the serviceability criteria enhances the protection of life and property.*

Code development reminder: *Code change proposals to this chapter will be considered by the IBC—Structural Code Development Committee during the 2019 (Group B) Code Development Cycle. See explanation on page iv.*

SECTION 1601
GENERAL

[S] 1601.1 Scope. The provisions of this chapter shall govern the structural design of buildings, structures and portions thereof regulated by this code.

Exceptions:

1. Carports are not required to comply with this chapter if they satisfy all the following criteria:
   - 1.1. Accessory to Group R-3 occupancies,
   - 1.2. Used to shelter only vehicles, trailers or vessels,
   - 1.3. Constructed of metal, plastic or fabric,
   - 1.4. No more than 3 pounds per square foot in total weight, and
   - 1.5. No more than 300 square feet covered area.
2. Temporary tents and similar structures are not required to comply with this chapter if they satisfy all the following criteria:
   - 2.1 The occupant load is less than 100;
   - 2.2 The structure is fully or partially enclosed and 400 square feet or less in area; or are entirely unenclosed and 700 square feet or less in area;
   - 2.3 The structure is constructed of metal, plastic or fabric; and
   - 2.4 The structure is no more than 3 pounds per square foot in total weight.

SECTION 1602
NOTATIONS

1602.1 Notations. The following notations are used in this chapter:

D = Dead load.
D_i = Weight of ice in accordance with Chapter 10 of ASCE 7.
E = Combined effect of horizontal and vertical earthquake induced forces as defined in Section 2.3.6 of ASCE 7.
F = Load due to fluids with well-defined pressures and maximum heights.
F_a = Flood load in accordance with Chapter 5 of ASCE 7.
H = Load due to lateral earth pressures, ground water pressure or pressure of bulk materials.
L = Roof live load greater than 20 psf (0.96 kN/m^2) and floor live load.
L_r = Roof live load of 20 psf (0.96 kN/m^2) or less.
R = Rain load.
S = Snow load.
T = Cumulative effects of self-straining load forces and effects.

V_{asd} = Allowable stress design wind speed, miles per hour (mph) (km/hr) where applicable.

V = Basic design wind speeds, miles per hour (mph) (km/hr) determined from Figures 1609.3(1) through 1609.3(8) or ASCE 7.

W = Load due to wind pressure.

W_i = Wind-on-ice in accordance with Chapter 10 of ASCE 7.

SECTION 1603
CONSTRUCTION DOCUMENTS

[S] 1603.1 General. *Construction documents* shall show the size, section and relative locations of structural members with floor levels, column centers and offsets dimensioned. The design loads and other information pertinent to the structural design required by Sections 1603.1.1 through 1603.1.9 shall be indicated on the *construction documents*.

Exception: *Construction documents* for buildings constructed in accordance with the *conventional light-frame construction* provisions of Section 2308 shall indicate the following structural design information:

1. Floor and roof dead and live loads.
2. ((~~Ground snow~~)) Snow load. ((~~, p_g.~~))
3. Basic design wind speed, V, miles per hour (mph) (km/hr) and allowable stress design wind speed, V_{asd}, as determined in accordance with Section 1609.3.1 and wind exposure.
4. *Seismic design category* and *site class*.
5. Flood design data, if located in *flood hazard areas* established in Section 1612.3.
6. Design load-bearing values of soils.
7. Rain load data.

1603.1.1 Floor live load. The uniformly distributed, concentrated and impact floor live load used in the design shall be indicated for floor areas. Use of live load reduction in accordance with Section 1607.11 shall be indicated for each type of live load used in the design.

[S] 1603.1.2 Roof live and snow load. The roof live and snow load used in the design shall be indicated for roof areas (Sections 1607.13 and 1608).

[S] 1603.1.3 ((~~Roof snow load data~~)) Reserved. ((~~The ground snow load, p_g, shall be indicated. In areas where the ground snow load, p_g, exceeds 10 pounds per square foot (psf) (0.479 kN/m^2), the following additional information shall also be provided, regardless of whether snow loads govern the design of the roof:~~

~~1. Flat-roof snow load, p_f.~~

~~2. Snow exposure factor, C_e.~~

~~3. Snow load importance factor, I_s.~~

~~4. Thermal factor, C_t.~~

~~5. Slope factor(s), C_s.~~

~~6. Drift surcharge load(s), p_d, where the sum of p_d and p_f exceeds 20 psf (0.96 kN/m^2).~~

~~7. Width of snow drift(s), w.~~))

1603.1.4 Wind design data. The following information related to wind loads shall be shown, regardless of whether wind loads govern the design of the lateral force-resisting system of the structure:

1. Basic design wind speed, V, miles per hour and allowable stress design wind speed, V_{asd}, as determined in accordance with Section 1609.3.1.
2. *Risk category*.
3. Wind exposure. Applicable wind direction if more than one wind exposure is utilized.
4. Applicable internal pressure coefficient.
5. Design wind pressures to be used for exterior component and cladding materials not specifically designed by the *registered design professional* responsible for the design of the structure, psf (kN/m^2).

1603.1.5 Earthquake design data. The following information related to seismic loads shall be shown, regardless of whether seismic loads govern the design of the lateral force-resisting system of the structure:

1. *Risk category*.
2. Seismic importance factor, I_e.

3. Mapped spectral response acceleration parameters, S_S and S_1.
4. *Site class*.
5. Design spectral response acceleration parameters, S_{DS} and S_{D1}.
6. *Seismic design category*.
7. Basic seismic force-resisting system(s).
8. Design base shear(s).
9. Seismic response coefficient(s), *CS*.
10. Response modification coefficient(s), *R*.
11. Analysis procedure used.

1603.1.6 Geotechnical information. The design load-bearing values of soils shall be shown on the *construction documents*.

1603.1.7 Flood design data. For buildings located in whole or in part in *flood hazard areas* as established in Section 1612.3, the documentation pertaining to design, if required in Section 1612.4, shall be included and the following information, referenced to the datum on the community's Flood Insurance Rate Map (FIRM), shall be shown, regardless of whether flood loads govern the design of the building:

1. Flood design class assigned according to ASCE 24.
2. In *flood hazard areas* other than *coastal high hazard areas* or *coastal A zones*, the elevation of the proposed lowest floor, including the basement.
3. In *flood hazard areas* other than *coastal high hazard areas* or *coastal A zones*, the elevation to which any nonresidential building will be dry floodproofed.
4. In *coastal high hazard areas* and *coastal A zones*, the proposed elevation of the bottom of the lowest horizontal structural member of the lowest floor, including the basement.

1603.1.8 Special loads. Special loads that are applicable to the design of the building, structure or portions thereof, including but not limited to the loads of machinery or equipment, and that are greater than specified floor and roof loads shall be specified by their descriptions and locations.

1603.1.8.1 Photovoltaic panel systems. The dead load of rooftop-mounted *photovoltaic panel systems*, including rack support systems, shall be indicated on the construction documents.

Note: Floor and roof design load provisions regarding posting of live loads, issuance of certificates of occupancy and restrictions on loading are located in Section 107 Floor and Roof Design Loads.

1603.1.9 Roof rain load data. Rain intensity, *i* (in/hr) (cm/hr), shall be shown regardless of whether rain loads govern the design.

SECTION 1604
GENERAL DESIGN REQUIREMENTS

1604.1 General. Building, structures and parts thereof shall be designed and constructed in accordance with strength design, *load and resistance factor design*, *allowable stress design*, empirical design or conventional construction methods, as permitted by the applicable material chapters and referenced standards.

1604.2 Strength. Buildings and other structures, and parts thereof, shall be designed and constructed to support safely the factored loads in load combinations defined in this code without exceeding the appropriate strength limit states for the materials of construction. Alternatively, buildings and other structures, and parts thereof, shall be designed and constructed to support safely the *nominal loads* in load combinations defined in this code without exceeding the appropriate specified allowable stresses for the materials of construction.

Loads and forces for occupancies or uses not covered in this chapter shall be subject to the approval of the *building official*.

1604.3 Serviceability. Structural systems and members thereof shall be designed to have adequate stiffness to limit deflections as indicated in Table 1604.3. Drift limits applicable to earthquake loading shall be in accordance with ASCE 7 Chapter 12, 13, 15 or 16, as applicable.

[W] TABLE 1604.5
RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES

RISK CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities.
II	Buildings and other structures except those listed in Risk Categories I, III and IV.
III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to: • Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300. • Buildings and other structures containing Group E occupancies with an occupant load greater than 250. • Buildings and other structures containing educational occupancies for students above the 12th grade with an occupant load greater than 500. • Group I-2, Condition 1 occupancies with 50 or more care recipients. • Group I-2, Condition 2 occupancies not having emergency surgery or emergency treatment facilities. • Group I-3 occupancies. • Any other occupancy with an occupant load greater than 5,000.[a] • Power-generating stations, water treatment facilities for potable water, wastewater treatment facilities and other public utility facilities not included in Risk Category IV. • Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that: Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the *International Fire Code*; and Are sufficient to pose a threat to the public if released.[b]
IV	Buildings and other structures designated as essential facilities, including but not limited to: • Group I-2, Condition 2 occupancies having emergency surgery or emergency treatment facilities. • Structures that house private emergency power generation, medical gas systems, HVAC systems or related infrastructure systems that support emergency surgery or emergency treatment facilities. ((~~• Ambulatory care facilities having emergency surgery or emergency treatment facilities.~~)) • Fire, rescue, ambulance and police stations and emergency vehicle garages. • Designated earthquake, hurricane or other emergency shelters. • Designated emergency preparedness, communications and operations centers and other facilities required for emergency response. • Power-generating stations and other public utility facilities required as emergency backup facilities for Risk Category IV structures. • Buildings and other structures containing quantities of highly toxic materials that: Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the *International Fire Code*; and Are sufficient to pose a threat to the public if released.[b] • Aviation control towers, air traffic control centers and emergency aircraft hangars. • Buildings and other structures having critical national defense functions. • Water storage facilities and pump structures required to maintain water pressure for fire suppression.

a. For purposes of occupant load calculation, occupancies required by Table 1004.5 to use gross floor area calculations shall be permitted to use net floor areas to determine the total occupant load.

b. Where approved by the building official, the classification of buildings and other structures as Risk Category III or IV based on their quantities of toxic, highly toxic or explosive materials is permitted to be reduced to Risk Category II, provided that it can be demonstrated by a hazard assessment in accordance with Section 1.5.3 of ASCE 7 that a release of the toxic, highly toxic or explosive materials is not sufficient to pose a threat to the public.

1604.5.1 Multiple occupancies. Where a building or structure is occupied by two or more occupancies not included in the same *risk category*, it shall be assigned the classification of the highest *risk category* corresponding to the various occupancies. Where buildings or structures have two or more portions that are structurally separated, each portion shall be separately classified. Where a separated portion of a building or structure provides required access to, required egress from or shares life safety components with another portion having a higher *risk category*, both portions shall be assigned to the higher *risk category*.

Exception: Where a *storm shelter* designed and constructed in accordance with ICC 500 is provided in a building, structure or portion thereof normally occupied for other purposes, the *risk category* for the normal occupancy of the building shall apply unless the *storm shelter* is a designated emergency shelter in accordance with Table 1604.5.

1604.6 In-situ load tests. The *building official* is authorized to require an engineering analysis or a load test, or both, of any construction whenever there is reason to question the safety of the construction for the intended occupancy. Engineering analysis and load tests shall be conducted in accordance with Section 1708.

1605.2 Load combinations using strength design or load and resistance factor design. Where strength design or load and resistance factor design is used, buildings and other structures, and portions thereof, shall be designed to resist the most critical effects resulting from the following combinations of factored loads:

$1.4(D + F)$ **(Equation 16-1)**

$1.2(D + F) + 1.6(L + H) + 0.5(L_r \text{ or } S \text{ or } R)$ **(Equation 16-2)**

$1.2(D + F) + 1.6(L_r \text{ or } S \text{ or } R) + 1.6H + (f_1L \text{ or } 0.5W)$ **(Equation 16-3)**

$1.2(D + F) + 1.0W + f_1L + 1.6H + 0.5(L_r \text{ or } S \text{ or } R)$ **(Equation 16-4)**

$1.2(D + F) + 1.0E + f_1L + 1.6H + f_2S$ **(Equation 16-5)**

$0.9D + 1.0W + 1.6H$ **(Equation 16-6)**

$0.9(D + F) + 1.0E + 1.6H$ **(Equation 16-7)**

where:

f_1 = 1 for places of public assembly live loads in excess of 100 pounds per square foot (4.79 kN/m^2), and parking garages; and 0.5 for other live loads.

f_2 = 0.7 for roof configurations (such as saw tooth) that do not shed snow off the structure, and 0.2 for other roof configurations.

Exceptions:

1. Where other factored load combinations are specifically required by other provisions of this code, such combinations shall take precedence.
2. Where the effect of *H* resists the primary variable load effect, a load factor of 0.9 shall be included with *H* where *H* is permanent and *H* shall be set to zero for all other conditions.

Interpretation I1605: The lateral pressure on basement and retaining walls due to earthquake motions, as required in Section 1803.5.12, is permitted to be considered as an earthquake load *E* for the purposes of use in load combinations.

1605.2.1 Other loads. Where flood loads, F_a, are to be considered in the design, the load combinations of Section 2.3.2 of ASCE 7 shall be used. Where self-straining loads, *T*, are considered in design, their structural effects in combination with other loads shall be determined in accordance with Section 2.3.4 of ASCE 7. Where an ice-sensitive structure is subjected to loads due to atmospheric icing, the load combinations of Section 2.3.3 of ASCE 7 shall be considered.

1605.3 Load combinations using allowable stress design. Load combinations for allowable stress design shall be in accordance with Section 1605.3.1 or 1605.3.2.

1605.3.1 Basic load combinations. Where *allowable stress design* (working stress design), as permitted by this code, is used, structures and portions thereof shall resist the most critical effects resulting from the following combinations of loads:

$D + F$ **(Equation 16-8)**

$D + H + F + L$ **(Equation 16-9)**

$D + H + F + (L_r \text{ or } S \text{ or } R)$ **(Equation 16-10)**

$D + H + F + 0.75(L) + 0.75(L_r \text{ or } S \text{ or } R)$ **(Equation 16-11)**

$D + H + F + (0.6W \text{ or } 0.7E)$ **(Equation 16-12)**

$D + H + F + 0.75(0.6W) + 0.75L + 0.75(L_r \text{ or } S \text{ or } R)$ **(Equation 16-13)**

$D + H + F + 0.75\,(0.7\,E) + 0.75\,L + 0.75\,S$ **(Equation 16-14)**

$0.6D + 0.6W + H$ **(Equation 16-15)**

$0.6(D + F) + 0.7E + H$ **(Equation 16-16)**

Exceptions:

1. Crane hook loads need not be combined with roof live load or with more than three-fourths of the snow load or one-half of the wind load.
2. Flat roof snow loads of 30 psf (1.44 kN/m^2) or less and roof live loads of 30 psf (1.44 kN/m^2) or less need not be combined with seismic loads. Where flat roof snow loads exceed 30 psf (1.44 kN/m^2), 20 percent shall be combined with seismic loads.
3. Where the effect of *H* resists the primary variable load effect, a load factor of 0.6 shall be included with *H* where *H* is permanent and *H* shall be set to zero for all other conditions.

4. In Equation 16-15, the wind load, W, is permitted to be reduced in accordance with Exception 2 of Section 2.4.1 of ASCE 7.
5. In Equation 16-16, 0.6 D is permitted to be increased to 0.9 D for the design of special reinforced masonry shear walls complying with Chapter 21.

1605.3.1.1 Stress increases. Increases in allowable stresses specified in the appropriate material chapter or the referenced standards shall not be used with the load combinations of Section 1605.3.1, except that increases shall be permitted in accordance with Chapter 23.

1605.3.1.2 Other loads. Where flood loads, F_a, are to be considered in design, the load combinations of Section 2.4.2 of ASCE 7 shall be used. Where self-straining loads, T, are considered in design, their structural effects in combination with other loads shall be determined in accordance with Section 2.4.4 of ASCE 7. Where an ice-sensitive structure is subjected to loads due to atmospheric icing, the load combinations of Section 2.4.3 of ASCE 7 shall be considered.

1605.3.2 Alternative basic load combinations. In lieu of the basic load combinations specified in Section 1605.3.1, structures and portions thereof shall be permitted to be designed for the most critical effects resulting from the following combinations. Where using these alternative basic allowable stress load combinations that include wind or seismic loads, allowable stresses are permitted to be increased or load combinations reduced where permitted by the material chapter of this code or the referenced standards. For load combinations that include the counteracting effects of dead and wind loads, only two-thirds of the minimum dead load likely to be in place during a design wind event shall be used. Where using allowable stresses that have been increased or load combinations that have been reduced as permitted by the material chapter of this code or the referenced standards, where wind loads are calculated in accordance with Chapters 26 through 31 of ASCE 7, the coefficient (ω) in the following equations shall be taken as 1.3. For other wind loads, (ω) shall be taken as 1. Where allowable stresses have not been increased or load combinations have not been reduced as permitted by the material chapter of this code or the referenced standards, (ω) shall be taken as 1. Where using these alternative load combinations to evaluate sliding, overturning and soil bearing at the soil-structure interface, the reduction of foundation overturning from Section 12.13.4 in ASCE 7 shall not be used. Where using these alternative basic load combinations for proportioning foundations for loadings, which include seismic loads, the vertical seismic *load effect*, E_v, in Equation 12.4-4 of ASCE 7 is permitted to be taken equal to zero.

$D + L + (L_r \text{ or } S \text{ or } R)$ **(Equation 16-17)**

$D + L + 0.6\,\omega W$ **(Equation 16-18)**

$D + L + 0.6\,\omega W + S/2$ **(Equation 16-19)**

$D + L + S + 0.6\,\omega W/2$ **(Equation 16-20)**

$D + L + S + E/1.4$ **(Equation 16-21)**

$0.9D + E/1.4$ **(Equation 16-22)**

Exceptions:

1. Crane hook loads need not be combined with roof live loads or with more than three-fourths of the snow load or one-half of the wind load.
2. Flat roof snow loads of 30 psf (1.44 kN/m^2) or less and roof live loads of 30 psf (1.44 kN/m^2) or less need not be combined with seismic loads. Where flat roof snow loads exceed 30 psf (1.44 kN/m^2), 20 percent shall be combined with seismic loads.

1605.3.2.1 Other loads. Where F, H or T are to be considered in the design, each applicable load shall be added to the combinations specified in Section 1605.3.2. Where self-straining loads, T, are considered in the design, their structural effects in combination with other loads shall be determined in accordance with Section 2.4.4 of ASCE 7.

SECTION 1606
DEAD LOADS

1606.1 General. Dead loads are those loads defined in Chapter 2 of this code. Dead loads shall be considered to be permanent loads.

1606.2 Design dead load. For purposes of design, the actual weights of materials of construction and fixed service equipment shall be used. In the absence of definite information, values used shall be subject to the approval of the *building official*.

[S] 1606.3 Solar zone for solar-ready roof. Where a *solar zone* is required by the *International Energy Conservation Code*, it shall be designed for an assumed dead load of 5 pounds per square foot in addition to other required live and dead loads. An area of 2 square feet for each 1000 square feet of solar zone area shall be designed for an assumed dead load of 175 pounds per square foot. If the actual weight of the system at the time of installation exceeds the assumed loads in this section, the actual weight shall be used to verify the adequacy of the roof structure. This area shall be located within or adjacent to the solar zone. The as-designed dead load and live load for the *solar zone* shall be clearly marked on the *construction documents.*

Note: The 175 psf represents the weight of the inverters necessary for PV systems. See *International Energy Conservation Code* Section C412.

SECTION 1607
LIVE LOADS

1607.1 General. Live loads are those loads defined in Chapter 2 of this code.

[S] TABLE 1607.1
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_o, AND MINIMUM CONCENTRATED LIVE LOADS[g]

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (pounds)
1. Apartments (see residential)	—	—
2. Access floor systems Office use Computer use	 50 100	 2,000 2,000
3. Armories and drill rooms	150[n]	—
4. Assembly areas Fixed seats (fastened to floor) Follow spot, projections and control rooms Lobbies Movable seats Stage floors Platforms (assembly) Other assembly areas	 60[m] 50 100[m] 100[m] 150[n] 100[m] 100[m]	—
5. Balconies and decks[h, ~~p~~]	1.5 times the live load for the area served, not required to exceed 100	—
6. Catwalks	40	300
7. ((~~Cornices~~)) *Canopies*[g] and cornices	60	—
8. Corridors First floor Other floors	 100 Same as occupancy served except as indicated	—
9. Dining rooms and restaurants	100[m]	—
10. Dwellings (see residential)	—	—
11. Elevator machine room and controlroom grating (on area of 2 inches by 2 inches)	—	300
12. Finish light floor plate construction (on area of 1 inch by 1 inch)	—	200
13. Fire escapes On single-family dwellings only	100 40	—
14. Garages (passenger vehicles only) Trucks and buses	40[o] See Section 1607.7	Note a
15. Handrails, guards and grab bars	See Section 1607.8	
16. Helipads	See Section 1607.6	
17. Hospitals Corridors above first floor Operating rooms, laboratories Patient rooms	 80 60 40	 1,000 1,000 1,000
18. Hotels (see residential)	—	—
19. Libraries Corridors above first floor Reading rooms Stack rooms	 80 60 150[b, n]	 1,000 1,000 1,000
20. Manufacturing Heavy Light	 250[n] 125[n]	 3,000 2,000
21. ((~~Marquees, except one- and two-family dwellings~~)) Reserved.	75	—
22. Office buildings Corridors above first floor File and computer rooms shall be designed for heavier loads based on anticipated occupancy Lobbies and first-floor corridors Offices	 80 — 100 50	 2,000 — 2,000 2,000

[S] TABLE 1607.1—continued
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_o, AND MINIMUM CONCENTRATED LIVE LOADS[g]

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (pounds)
23. Penal institutions		
Cell blocks	40	—
Corridors	100	
24. Recreational uses:		
Bowling alleys, poolrooms and similar uses	75[m]	
Dance halls and ballrooms	100[m]	
Gymnasiums	100[m]	—
Ice skating rink	250[n]	
Reviewing stands, grandstands and bleachers	100[c, m]	
Roller skating rink	100[m]	
Stadiums and arenas with fixed seats (fastened to floor)	60[c, m]	
25. Residential		
One- and two-family dwellings		
Uninhabitable attics without storage[i]	10	
Uninhabitable attics with storage[i, j, k]	20	
Habitable attics and sleeping areas[k]	30	
Canopies, including marquees	20	—
Non-residential portion of live-work units	50[m]	
All other areas	40	
Hotels and multifamily dwellings		
Private rooms and corridors serving them	40	
Public rooms[m] and corridors serving them	100	
26. Roofs		
All roof surfaces subject to maintenance workers		300
Awnings and canopies:		
Fabric construction supported by a skeleton structure	5[m]	
All other construction, except one- and two-family dwellings	20	
Ordinary flat, pitched, and curved roofs (that are not occupiable)	20	
Primary roof members exposed to a work floor		
Single panel point of lower chord of roof trusses or any point along primary structural members supporting roofs over manufacturing, storage warehouses, and repair garages		2,000
All other primary roof members		300
Occupiable roofs:		
Roof gardens	100	
Assembly areas	100[m]	
All other similar areas	Note 1	Note 1
27. Schools		
Classrooms	40	1,000
Corridors above first floor	80	1,000
First-floor corridors	100	1,000
28. Scuttles, skylight ribs and accessible ceilings	—	200
29. Sidewalks, vehicular driveways and yards, subject to trucking	250[d, n]	8,000[e]
30. Stairs and exits		
One- and two-family dwellings	40	300[f]
All other	100	300[f]
31. Storage warehouses (shall be designed for heavier loads if required for anticipated storage)		
Heavy	250[n]	—
Light	125[n]	
32. Stores		
Retail		
First floor	100	1,000
Upper floors	75	1,000
Wholesale, all floors	125[n]	1,000
33. Vehicle barriers	See Section 1607.9	
34. Walkways and elevated platforms (other than exitways)	60	—
35. Yards and terraces, pedestrians	100[m]	—

For SI: 1 inch = 25.4 mm, 1 square inch = 645.16 mm^2,
1 square foot = 0.0929 m^2, 1 pound per square foot = 0.0479 kN/m^2,
1 pound = 0.004448 kN, 1 pound per cubic foot = 16 kg/m^3.

a. Floors in garages or portions of buildings used for the storage of motor vehicles shall be designed for the uniformly distributed live loads of this table or the following concentrated loads: (1) for garages restricted to passenger vehicles accommodating not more than nine passengers, 3,000 pounds acting on an area of 4-1/2 inches by 4-1/2 inches; (2) for mechanical parking structures without slab or deck that are used for storing passenger vehicles only, 2,250 pounds per wheel.

b. The loading applies to stack room floors that support nonmobile, double-faced library book stacks, subject to the following limitations:
   1. The nominal book stack unit height shall not exceed 90 inches.
   2. The nominal shelf depth shall not exceed 12 inches for each face.

3. Parallel rows of double-faced book stacks shall be separated by aisles not less than 36 inches wide.

c. Design in accordance with ICC 300.

d. Other uniform loads in accordance with an approved method containing provisions for truck loadings shall be considered where appropriate.

e. The concentrated wheel load shall be applied on an area of 4.5 inches by 4.5 inches.

f. The minimum concentrated load on stair treads shall be applied on an area of 2 inches by 2 inches. This load need not be assumed to act concurrently with the uniform load.

((~~g. Where snow loads occur that are in excess of the design conditions, the structure shall be designed to support the loads due to the increased loads caused by drift buildup or a greater snow design determined by the building official (see Section 1608).~~))

g. This loading condition need only be considered for *canopies* that meet all of the following conditions:

1. The upper surface is sloped less than 30 degrees (0.5 rad) from horizontal; and
2. The *canopy* is located adjacent to a right of way or assembly area; and
3. The *canopy* is located less than 10 feet (3048 mm) above the ground at all points, or less than 10 feet (3048 mm) below an adjacent roof, or less than 10 feet (3048 mm) from operable openings above or adjacent to the level of the *canopy*.

For other *canopies*, roof loads as specified in this chapter shall be applied.

Canopy is defined in Section 202.

h. See Section 1604.8.3 for decks attached to exterior walls.

i. Uninhabitable attics without storage are those where the maximum clear height between the joists and rafters is less than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. This live load need not be assumed to act concurrently with any other live load requirements.

j. Uninhabitable attics with storage are those where the maximum clear height between the joists and rafters is 42 inches or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses.

The live load need only be applied to those portions of the joists or truss bottom chords where both of the following conditions are met:

i. The attic area is accessible from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is not less than 30 inches.
ii. The slopes of the joists or truss bottom chords are not greater than two units vertical in 12 units horizontal.

The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed concurrent live load of not less than 10 pounds per square foot.

k. Attic spaces served by stairways other than the pull-down type shall be designed to support the minimum live load specified for habitable attics and sleeping rooms.

l. Areas of occupiable roofs, other than roof gardens and assembly areas, shall be designed for appropriate loads as approved by the building official. Unoccupied landscaped areas of roofs shall be designed in accordance with Section 1607.13.3.

m. Live load reduction is not permitted.

n. Live load reduction is only permitted in accordance with Section 1607.11.1.2 or Item 1 of Section 1607.11.2.

o. Live load reduction is only permitted in accordance with Section 1607.11.1.3 or Item 2 of Section 1607.11.2.

p. Decks and balconies that are accessed only from a dwelling unit or private office shall comply with live load requirements of the occupancy served. Other decks and balconies are considered "other assembly areas."

1607.2 Loads not specified. For occupancies or uses not designated in Table 1607.1, the live load shall be determined in accordance with a method *approved* by the *building official*.

1607.3 Uniform live loads. The live loads used in the design of buildings and other structures shall be the maximum loads expected by the intended use or occupancy but shall not be less than the minimum uniformly distributed live loads given in Table 1607.1.

1607.4 Concentrated live loads. Floors, roofs and other similar surfaces shall be designed to support the uniformly distributed live loads prescribed in Section 1607.3 or the concentrated live loads, given in Table 1607.1, whichever produces the greater *load effects*. Unless otherwise specified, the indicated concentration shall be assumed to be uniformly distributed over an area of 2-1/2 feet by 2-1/2 feet (762 mm by 762 mm) and shall be located so as to produce the maximum *load effects* in the structural members.

1607.5 Partition loads. In office buildings and in other buildings where partition locations are subject to change, provisions for partition weight shall be made, whether or not partitions are shown on the construction documents, unless the specified live load is 80 psf (3.83 kN/m^2) or greater. The partition load shall be not less than a uniformly distributed live load of 15 psf (0.72 kN/m^2).

1607.6 Helipads. Helipads shall be designed for the following live loads:

1. A uniform live load, *L*, as specified in Items 1.1 and 1.2. This load shall not be reduced.
   1.1. 40 psf (1.92 kN/m^2) where the design basis helicopter has a maximum take-off weight of 3,000 pounds (13.35 kN) or less.
   1.2. 60 psf (2.87 kN/m^2) where the design basis helicopter has a maximum take-off weight greater than 3,000 pounds (13.35 kN).
2. A single concentrated live load, *L*, of 3,000 pounds (13.35 kN) applied over an area of 4.5 inches by 4.5 inches (114 mm by 114 mm) and located so as to produce the maximum load effects on the structural elements under consideration. The concentrated load is not required to act concurrently with other uniform or concentrated live loads.

3. Two single concentrated live loads, *L*, 8 feet (2438 mm) apart applied on the landing pad (representing the helicopter's two main landing gear, whether skid type or wheeled type), each having a magnitude of 0.75 times the maximum take-off weight of the helicopter, and located so as to produce the maximum load effects on the structural elements under consideration. The concentrated loads shall be applied over an area of 8 inches by 8 inches (203 mm by 203 mm) and are not required to act concurrently with other uniform or concentrated live loads.

Landing areas designed for a design basis helicopter with maximum take-off weight of 3,000-pounds (13.35 kN) shall be identified with a 3,000 pound (13.34 kN) weight limitation. The landing area weight limitation shall be indicated by the numeral "3" (kips) located in the bottom right corner of the landing area as viewed from the primary approach path. The indication for the landing area weight limitation shall be a minimum 5 feet (1524 mm) in height.

1607.7 Heavy vehicle loads. Floors and other surfaces that are intended to support vehicle loads greater than a 10,000-pound (4536 kg) gross vehicle weight rating shall comply with Sections 1607.7.1 through 1607.7.5.

1607.7.1 Loads. Where any structure does not restrict access for vehicles that exceed a 10,000-pound (4536 kg) gross vehicle weight rating, those portions of the structure subject to such loads shall be designed using the vehicular live loads, including consideration of impact and fatigue, in accordance with the codes and specifications required by the jurisdiction having authority for the design and construction of the roadways and bridges in the same location of the structure.

1607.7.2 Fire truck and emergency vehicles. Where a structure or portions of a structure are accessed and loaded by fire department access vehicles and other similar emergency vehicles, the structure shall be designed for the greater of the following loads:

1. The actual operational loads, including outrigger reactions and contact areas of the vehicles as stipulated and approved by the building official.
2. The live loading specified in Section 1607.7.1.

1607.7.3 Heavy vehicle garages. Garages designed to accommodate vehicles that exceed a 10,000-pound (4536 kg) gross vehicle weight rating, shall be designed using the live loading specified by Section 1607.7.1. For garages the design for impact and fatigue is not required.

Exception: The vehicular live loads and load placement are allowed to be determined using the actual vehicle weights for the vehicles allowed onto the garage floors, provided that such loads and placement are based on rational engineering principles and are approved by the building official, but shall be not less than 50 psf (2.9 kN/m^2). This live load shall not be reduced.

1607.7.4 Forklifts and movable equipment. Where a structure is intended to have forklifts or other movable equipment present, the structure shall be designed for the total vehicle or equipment load and the individual wheel loads for the anticipated vehicles as specified by the owner of the facility. These loads shall be posted in accordance with Section 1607.7.5.

1607.7.4.1 Impact and fatigue. Impact loads and fatigue loading shall be considered in the design of the supporting structure. For the purposes of design, the vehicle and wheel loads shall be increased by 30 percent to account for impact.

[S] 1607.7.5 Posting. The maximum weight of vehicles allowed into or on a garage or other structure shall be posted by the owner or the owner's authorized agent in accordance with Section ((~~106.1~~)) 107.

1607.8 Loads on handrails, guards, grab bars and seats. Handrails and *guards* shall be designed and constructed for the structural loading conditions set forth in Section 1607.8.1. Grab bars, shower seats and accessible benches shall be designed and constructed for the structural loading conditions set forth in Section 1607.8.2.

1607.8.1 Handrails and guards. Handrails and *guards* shall be designed to resist a linear load of 50 pounds per linear foot (plf) (0.73 kN/m) in accordance with Section 4.5.1.1 of ASCE 7. Glass handrail assemblies and *guards* shall comply with Section 2407.

Exceptions:

1. For one- and two-family dwellings, only the single concentrated load required by Section 1607.8.1.1 shall be applied.
2. In Group I-3, F, H and S occupancies, for areas that are not accessible to the general public and that have an *occupant load* less than 50, the minimum load shall be 20 pounds per foot (0.29 kN/m).

1607.8.1.1 Concentrated load. Handrails and guards shall be designed to resist a concentrated load of 200 pounds (0.89 kN) in accordance with Section 4.5.1.1 of ASCE 7.

1607.8.1.2 Intermediate rails. Intermediate rails (all those except the handrail), balusters and panel fillers shall be designed to resist a concentrated load of 50 pounds (0.22 kN) in accordance with Section 4.5.1.1 of ASCE 7.

1607.8.2 Grab bars, shower seats and dressing room bench seats. Grab bars, shower seats and dressing room bench seats shall be designed to resist a single concentrated load of 250 pounds (1.11 kN) applied in any direction at any point on the grab bar or seat so as to produce the maximum load effects.

3. For live loads not exceeding 100 psf (4.79 kN/m^2), the design live load for any structural member supporting 150 square feet (13.94 m^2) or more is permitted to be reduced in accordance with Equation 16-24.
4. For one-way slabs, the area, *A*, for use in Equation 16-24 shall not exceed the product of the slab span and a width normal to the span of 0.5 times the slab span.

$R = 0.08(A - 150)$ **(Equation 16-24)**

For SI: $R = 0.861(A - 13.94)$

Such reduction shall not exceed the smallest of:

1. 40 percent for members supporting one floor.
2. 60 percent for members supporting two or more floors.
3. *R* as determined by the following equation:

$R = 23.1(1 + D/L_o)$ **(Equation 16-25)**

where:

A = Area of floor supported by the member, square feet (m^2).

D = Dead load per square foot (m^2) of area supported.

L_o = Unreduced live load per square foot (m^2) of area supported.

R = Reduction in percent.

1607.12 Distribution of floor loads. Where uniform floor live loads are involved in the design of structural members arranged so as to create continuity, the minimum applied loads shall be the full dead loads on all spans in combination with the floor live loads on spans selected to produce the greatest *load effect* at each location under consideration. Floor live loads are permitted to be reduced in accordance with Section 1607.11.

[S] 1607.13 Roof loads. The structural supports of roofs and ((~~marquees~~)) *canopies* shall be designed to resist wind and, where applicable, snow and earthquake loads, in addition to the dead load of construction and the appropriate live loads as prescribed in this section. ((~~, or as set forth in Table 1607.1.~~)) The live loads acting on a sloping surface shall be assumed to act vertically on the horizontal projection of that surface.

[S] 1607.13.1 Distribution of roof loads. Where uniform roof live loads are reduced to less than 20 psf (0.96 kN/m^2) in accordance with Section 1607.13.2.1 and are applied to the design of structural members arranged so as to create continuity, the reduced roof live load shall be applied to adjacent spans or to alternate spans, whichever produces the most unfavorable *load effect*. See Section 1607.13.2 for reductions in minimum roof live loads and Section 7.5 of ASCE 7 for ((~~partial~~)) snow loading.

[S] 1607.13.2 General. The minimum uniformly distributed live loads of roofs and ((~~marquees~~)) *canopies*, L_o, in Table 1607.1 are permitted to be reduced in accordance with Section 1607.13.2.1.

1607.13.2.1 Ordinary roofs, awnings and canopies. Ordinary flat, pitched and curved roofs, and awnings and canopies other than of fabric construction supported by a skeleton structure, are permitted to be designed for a reduced uniformly distributed roof live load, L_r, as specified in the following equations or other controlling combinations of loads as specified in Section 1605, whichever produces the greater *load effect*.

In structures such as greenhouses, where special scaffolding is used as a work surface for workers and materials during maintenance and repair operations, a lower roof load than specified in the following equations shall not be used unless *approved* by the *building official*. Such structures shall be designed for a minimum roof live load of 12 psf (0.58 kN/m^2).

$L_r = L_o R_1 R_2$ **(Equation 16-26)**

where: $12 \le L_r \le 20$

For SI: $L_r = L_o R_1 R_2$

where: $0.58 \le L_r \le 0.96$

L_o = Unreduced roof live load per square foot (m^2) of horizontal projection supported by the member (see Table 1607.1).

L_r = Reduced roof live load per square foot (m^2) of horizontal projection supported by the member.

The reduction factors R_1 and R_2 shall be determined as follows:

$R_1 = 1$ for $A_t \le 200$ square feet (18.58 m^2)

(Equation 16-27)

$R_1 = 1.2 - 0.001A_t$ for 200 square feet $< A_t <$ 600 square feet **(Equation 16-28)**

For SI: $1.2 - 0.011A_t$ for 18.58 square meters $< A_t <$ 55.74 square meters

$R_1 = 0.6$ for $A_t \geq 600$ square feet (55.74 m^2)

(Equation 16-29)

where:

A_t = Tributary area (span length multiplied by effective width) in square feet (m^2) supported by the member, and

$R_2 = 1$ for $F \leq 4$ **(Equation 16-30)**

$R_2 = 1.2 - 0.05\,F$ for $4 < F < 12$ **(Equation 16-31)**

$R_2 = 0.6$ for $F \geq 12$ **(Equation 16-32)**

where:

F = For a sloped roof, the number of inches of rise per foot (for SI: $F = 0.12 \times$ slope, with slope expressed as a percentage), or for an arch or dome, the rise-to-span ratio multiplied by 32.

1607.13.3 Occupiable roofs. Areas of roofs that are occupiable, such as *vegetative roofs*, roof gardens or for assembly or other similar purposes, and ((~~marquees~~)) *canopies* are permitted to have their uniformly distributed live loads reduced in accordance with Section 1607.11.

1607.13.3.1 Vegetative and landscaped roofs. The weight of all landscaping materials shall be considered as dead load and shall be computed on the basis of saturation of the soil as determined in accordance with Section 3.1.4 of ASCE 7. The uniform design live load in unoccupied landscaped areas on roofs shall be 20 psf (0.958 kN/m^2). The uniform design live load for occupied landscaped areas on roofs shall be determined in accordance with Table 1607.1.

1607.13.4 Awnings and canopies. Awnings and canopies shall be designed for uniform live loads as required in Table 1607.1 as well as for snow loads and wind loads as specified in Sections 1608 and 1609.

1607.13.5 Photovoltaic panel systems. Roof structures that provide support for *photovoltaic panel systems* shall be designed in accordance with Sections 1607.13.5.1 through 1607.13.5.4, as applicable.

1607.13.5.1 Roof live load. Roof structures that support photovoltaic panel systems shall be designed to resist each of the following conditions:

1. Applicable uniform and concentrated roof loads with the photovoltaic panel system dead loads.

   Exception: Roof live loads need not be applied to the area covered by photovoltaic panels where the clear space between the panels and the roof surface is 24 inches (610 mm) or less.

2. Applicable uniform and concentrated roof loads without the photovoltaic panel system present.

1607.13.5.2 Photovoltaic panels or modules. The structure of a roof that supports solar photovoltaic panels or modules shall be designed to accommodate the full solar photovoltaic panels or modules and ballast dead load, including concentrated loads from support frames in combination with the loads from Section 1607.13.5.1 and other applicable loads. Where applicable, snow drift loads created by the photovoltaic panels or modules shall be included.

1607.13.5.2.1 Photovoltaic panels installed on open grid roof structures. Structures with open grid framing and without a roof deck or sheathing supporting photovoltaic panel systems shall be designed to support the uniform and concentrated roof live loads specified in Section 1607.13.5.1, except that the uniform roof live load shall be permitted to be reduced to 12 psf (0.57 kN/m^2).

1607.13.5.3 Photovoltaic panels or modules installed as an independent structure. Solar photovoltaic panels or modules that are independent structures and do not have accessible/occupied space underneath are not required to accommodate a roof photovoltaic live load, provided that the area under the structure is restricted to keep the public away. Other loads and combinations in accordance with Section 1605 shall be accommodated.

Solar photovoltaic panels or modules that are designed to be the roof, span to structural supports and have accessible/occupied space underneath shall have the panels or modules and all supporting structures designed to support a roof photovoltaic live load, as defined in Section 1607.13.5.1 in combination with other applicable loads. Solar photovoltaic panels or modules in this application are not permitted to be classified as "not accessible" in accordance with Section 1607.13.5.1.

1607.13.5.4 Ballasted photovoltaic panel systems. Roof structures that provide support for ballasted *photovoltaic panel systems* shall be designed, or analyzed, in accordance with Section 1604.4; checked in accordance with Section 1604.3.6 for deflections; and checked in accordance with Section 1611 for ponding.

1607.14 Crane loads. The crane live load shall be the rated capacity of the crane. Design loads for the runway beams, including connections and support brackets, of moving bridge cranes and monorail cranes shall include the maximum wheel loads of the crane and the vertical impact, lateral and longitudinal forces induced by the moving crane.

1607.14.1 Maximum wheel load. The maximum wheel loads shall be the wheel loads produced by the weight of the bridge, as applicable, plus the sum of the rated capacity and the weight of the trolley with the trolley positioned on its runway at the location where the resulting load effect is maximum.

1607.14.2 Vertical impact force. The maximum wheel loads of the crane shall be increased by the following percentages to determine the induced vertical impact or vibration force:

Monorail cranes (powered) . . . . . 25 percent
Cab-operated or remotely operated bridge cranes (powered) . . . . . 25 percent
Pendant-operated bridge cranes (powered) . . . . . 10 percent
Bridge cranes or monorail cranes with hand-geared bridge, trolley and hoist . . . . . 0 percent

1607.14.3 Lateral force. The lateral force on crane runway beams with electrically powered trolleys shall be calculated as 20 percent of the sum of the rated capacity of the crane and the weight of the hoist and trolley. The lateral force shall be assumed to act horizontally at the traction surface of a runway beam, in either direction perpendicular to the beam, and shall be distributed with due regard to the lateral stiffness of the runway beam and supporting structure.

1607.14.4 Longitudinal force. The longitudinal force on crane runway beams, except for bridge cranes with hand-geared bridges, shall be calculated as 10 percent of the maximum wheel loads of the crane. The longitudinal force shall be assumed to act horizontally at the traction surface of a runway beam, in either direction parallel to the beam.

1607.15 Interior walls and partitions. Interior walls and partitions that exceed 6 feet (1829 mm) in height, including their finish materials, shall have adequate strength and stiffness to resist the loads to which they are subjected but not less than a horizontal load of 5 psf (0.240 kN/m^2).

1607.15.1 Fabric partitions. Fabric partitions that exceed 6 feet (1829 mm) in height, including their finish materials, shall have adequate strength and stiffness to resist the following load conditions:

1. The horizontal distributed load need only be applied to the partition framing. The total area used to determine the distributed load shall be the area of the fabric face between the framing members to which the fabric is attached. The total distributed load shall be uniformly applied to such framing members in proportion to the length of each member.
2. A concentrated load of 40 pounds (0.176 kN) applied to an 8-inch-diameter (203 mm) area [50.3 square inches (32 452 mm^2)] of the fabric face at a height of 54 inches (1372 mm) above the floor.

1607.15.2 Fire walls. In order to meet the structural stability requirements of Section 706.2 where the structure on either side of the wall has collapsed, fire walls and their supports shall be designed to withstand a minimum horizontal allowable stress load of 5 psf (0.240 kN/m^2).

SECTION 1608
SNOW LOADS

[S] 1608.1 General. Roofs shall be designed for a uniform snow load of at least 25 psf (1200 Pa). Design snow loads shall be determined in accordance with Chapter 7 of ASCE 7, but the design roof load shall be not less than that determined by Section 1607.

1608.2 Ground snow loads. The ground snow loads to be used in determining the design snow loads for roofs shall be determined in accordance with ASCE 7 or Figure 1608.2 for the contiguous United States and Table 1608.2 for Alaska. Site-specific case studies shall be made in areas designated "CS" in Figure 1608.2. Ground snow loads for sites at elevations above the limits indicated in Figure 1608.2 and for all sites within the CS areas shall be *approved*. Ground snow load determination for such sites shall be based on an extreme value statistical analysis of data available in the vicinity of the site using a value with a 2-percent annual probability of being exceeded (50-year mean recurrence interval). Snow loads are zero for Hawaii, except in mountainous regions as *approved* by the *building official*.

$$V_{asd} = V\sqrt{0.6} \qquad \textbf{(Equation 16-33)}$$

where:

V_{asd} = Allowable stress design wind speed applicable to methods specified in Exceptions 4 and 5 of Section 1609.1.1.

V = Basic design wind speeds determined from Figures 1609.3(1) through 1609.3(8).

TABLE 1609.3.1
WIND SPEED CONVERSIONS[a, b, c]

V	100	110	120	130	140	150	160	170	180	190	200
V_{asd}	78	85	93	101	108	116	124	132	139	147	155

For SI: 1 mile per hour = 0.44 m/s.

a. Linear interpolation is permitted.

b. V_{asd} = allowable stress design wind speed applicable to methods specified in Exceptions 1 through 5 of Section 1609.1.1.

c. V = basic design wind speeds determined from Figures 1609.3(1) through 1609.3(8).

1609.4 Exposure category. For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. Account shall be taken of variations in ground surface roughness that arise from natural topography and vegetation as well as from constructed features.

1609.4.1 Wind directions and sectors. For each selected wind direction at which the wind loads are to be evaluated, the exposure of the building or structure shall be determined for the two upwind sectors extending 45 degrees (0.79 rad) either side of the selected wind direction. The exposures in these two sectors shall be determined in accordance with Sections 1609.4.2 and 1609.4.3 and the exposure resulting in the highest wind loads shall be used to represent winds from that direction.

1609.4.2 Surface roughness categories. A ground surface roughness within each 45-degree (0.79 rad) sector shall be determined for a distance upwind of the site as defined in Section 1609.4.3 from the following categories, for the purpose of assigning an exposure category as defined in Section 1609.4.3.

Surface Roughness B. Urban and suburban areas, wooded areas or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger.

Surface Roughness C. Open terrain with scattered obstructions having heights generally less than 30 feet (9144 mm). This category includes flat open country, and grasslands.

Surface Roughness D. Flat, unobstructed areas and water surfaces. This category includes smooth mud flats, salt flats and unbroken ice.

[S] 1609.4.3 Exposure categories. An exposure category shall be determined in accordance with the following:

((~~**Exposure B.** For buildings with a mean roof height of less than or equal to 30 feet (9144 mm), Exposure B shall apply where the ground surface roughness, as defined by Surface Roughness B, prevails in the upwind direction for a distance of not less than 1,500 feet (457 m). For buildings with a mean roof height greater than 30 feet (9144 mm), Exposure B shall apply where Surface Roughness B prevails in the upwind direction for a distance of not less than 2,600 feet (792 m) or 20 times the height of the building, whichever is greater.~~

~~**Exposure C.** Exposure C shall apply for all cases where Exposure B or D does not apply.~~

~~**Exposure D.** Exposure D shall apply where the ground surface roughness, as defined by Surface Roughness D, prevails in the upwind direction for a distance of not less than 5,000 feet (1524 m) or 20 times the height of the building, whichever is greater. Exposure D shall apply where the ground surface roughness immediately upwind of the site is B or C, and the site is within a distance of 600 feet (183 m) or 20 times the building height, whichever is greater, from an Exposure D condition as defined in the previous sentence.~~))

Exposure B. Exposure B shall apply for all cases where Exposure C does not apply.

Exposure C. Exposure C shall apply along the shorelines where the ground surface roughness, as defined by Surface Roughness D, prevails in the following conditions:

1. The upwind direction of the shoreline is exposed to winds coming from the south through west (180 degrees to 270 degrees), and
2. The distance of Surface Roughness D is at least 5,000 feet (1524 m).

Exposure C extends a distance of 600 feet (183 m) from the shoreline as defined in the previous sentence.

Exposure D. Exposure D shall not apply anywhere within the City of Seattle.

Interpretation I1609.4.3: A map of the Exposure C areas is provided at https://www.seattle.gov/sdci/resources/wind-load-factors.

1609.5 Roof systems. Roof systems shall be designed and constructed in accordance with Sections 1609.5.1 through 1609.5.3, as applicable.

1609.5.1 Roof deck. The roof deck shall be designed to withstand the wind pressures determined in accordance with ASCE 7.

1609.5.2 Roof coverings. Roof coverings shall comply with Section 1609.5.1.

Exception: Rigid tile roof coverings that are air permeable and installed over a roof deck complying with Section 1609.5.1 are permitted to be designed in accordance with Section 1609.5.3.

Asphalt shingles installed over a roof deck complying with Section 1609.5.1 shall comply with the wind-resistance requirements of Section 1504.1.1.

1609.5.3 Rigid tile. Wind loads on rigid tile roof coverings shall be determined in accordance with the following equation:

$$M_a = q_h C_L b L L_a [1.0 - GC_p] \qquad \textbf{(Equation 16-34)}$$

For SI:

$$M_a = \frac{q_h C_L b L L_a [1.0 - GC_p]}{1,000}$$

where:

b = Exposed width, feet (mm) of the roof tile.

C_L = Lift coefficient. The lift coefficient for concrete and clay tile shall be 0.2 or shall be determined by test in accordance with Section 1504.2.1.

GC_p = Roof pressure coefficient for each applicable roof zone determined from Chapter 30 of ASCE 7. Roof coefficients shall not be adjusted for internal pressure.

L = Length, feet (mm) of the roof tile.

L_a = Moment arm, feet (mm) from the axis of rotation to the point of uplift on the roof tile. The point of uplift shall be taken at 0.76L from the head of the tile and the middle of the exposed width. For roof tiles with nails or screws (with or without a tail clip), the axis of rotation shall be taken as the head of the tile for direct deck application or as the top edge of the batten for battened applications. For roof tiles fastened only by a nail or screw along the side of the tile, the axis of rotation shall be determined by testing. For roof tiles installed with battens and fastened only by a clip near the tail of the tile, the moment arm shall be determined about the top edge of the batten with consideration given for the point of rotation of the tiles based on straight bond or broken bond and the tile profile.

M_a = Aerodynamic uplift moment, feet-pounds (N-mm) acting to raise the tail of the tile.

q_h = Wind velocity pressure, psf (kN/m^2) determined from Section 26.10.2 of ASCE 7.

Concrete and clay roof tiles complying with the following limitations shall be designed to withstand the aerodynamic uplift moment as determined by this section.

1. The roof tiles shall be either loose laid on battens, mechanically fastened, mortar set or adhesive set.
2. The roof tiles shall be installed on solid sheathing that has been designed as components and cladding.
3. An underlayment shall be installed in accordance with Chapter 15.
4. The tile shall be single lapped interlocking with a minimum head lap of not less than 2 inches (51 mm).
5. The length of the tile shall be between 1.0 and 1.75 feet (305 mm and 533 mm).
6. The exposed width of the tile shall be between 0.67 and 1.25 feet (204 mm and 381 mm).
7. The maximum thickness of the tail of the tile shall not exceed 1.3 inches (33 mm).
8. Roof tiles using mortar set or adhesive set systems shall have not less than two-thirds of the tile's area free of mortar or adhesive contact.

SECTION 1610
SOIL LATERAL LOADS

1610.1 General. Foundation walls and retaining walls shall be designed to resist lateral soil loads. Soil loads specified in Table 1610.1 shall be used as the minimum design lateral soil loads unless determined otherwise by a geotechnical investigation in accordance with Section 1803. Foundation walls and other walls in which horizontal movement is restricted at the top shall be designed for at-rest pressure. Retaining walls free to move and rotate at the top shall be permitted to be designed for active pres-

1611.2 Ponding instability. Susceptible bays of roofs shall be evaluated for ponding instability in accordance with Section 8.4 of ASCE 7.

1611.3 Controlled drainage. Roofs equipped with hardware to control the rate of drainage shall be equipped with a secondary drainage system at a higher elevation that limits accumulation of water on the roof above that elevation. Such roofs shall be designed to sustain the load of rainwater that will accumulate on them to the elevation of the secondary drainage system plus the uniform load caused by water that rises above the inlet of the secondary drainage system at its design flow determined from Section 1611.1. Such roofs shall be checked for ponding instability in accordance with Section 1611.2.

SECTION 1612
FLOOD LOADS

1612.1 General. Within *flood hazard areas* as established in Section 1612.3, all new construction of buildings, structures and portions of buildings and structures, including substantial improvement and restoration of substantial damage to buildings and structures, shall be designed and constructed to resist the effects of flood hazards and flood loads. For buildings that are located in more than one *flood hazard area*, the provisions associated with the most restrictive *flood hazard area* shall apply.

1612.2 Design and construction. The design and construction of buildings and structures located in *flood hazard areas*, including *coastal high hazard areas* and *coastal A zones*, shall be in accordance with Chapter 5 of ASCE 7 and ASCE 24.

[S] 1612.3 Establishment of flood hazard areas. ((~~To establish *flood hazard areas*, the applicable governing authority shall adopt a flood hazard map and supporting data. The flood hazard map shall include, at a minimum, areas of special flood hazard as identified by the Federal Emergency Management Agency in an engineering report entitled "The Flood Insurance Study for **[INSERT NAME OF JURISDICTION]**," dated **[INSERT DATE OF ISSUANCE]**, as amended or revised with the accompanying Flood Insurance Rate Map (FIRM) and Flood Boundary and Floodway Map (FBFM) and related supporting data along with any revisions thereto.~~)) The ((~~adopted~~)) flood hazard map and supporting data adopted in Seattle Municipal Code Section 25.06.050 and areas mapped by Seattle Public Utilities are hereby adopted by reference and declared to be part of this section.

1612.3.1 Design flood elevations. Where design flood elevations are not included in the *flood hazard areas* established in Section 1612.3, or where floodways are not designated, the *building official* is authorized to require the applicant to do one of the following:

1. Obtain and reasonably utilize any design flood elevation and floodway data available from a federal, state or other source.
2. Determine the design flood elevation or floodway in accordance with accepted hydrologic and hydraulic engineering practices used to define special flood hazard areas. Determinations shall be undertaken by a *registered design professional* who shall document that the technical methods used reflect currently accepted engineering practice.

1612.3.2 Determination of impacts. In riverine *flood hazard areas* where design flood elevations are specified but floodways have not been designated, the applicant shall provide a floodway analysis that demonstrates that the proposed work will not increase the design flood elevation more than 1 foot (305 mm) at any point within the jurisdiction of the applicable governing authority.

[S] 1612.4 Flood hazard documentation. The following documentation shall be prepared and sealed by a *registered design professional* and submitted to the *building official*:

1. For construction in *flood hazard areas* other than *coastal high hazard areas* or *coastal A zones*:
   - 1.1. The elevation of the lowest floor, including the basement, as required by the lowest floor elevation inspection in Section ((~~110.3.3~~)) 108.9.4 and for the final inspection in Section ((~~110.3.11.1~~)) 108.9.9.1.
   - 1.2. For fully enclosed areas below the design flood elevation where provisions to allow for the automatic entry and exit of floodwaters do not meet the minimum requirements in Section 2.7.2.1 of ASCE 24, *construction documents* shall include a statement that the design will provide for equalization of hydrostatic flood forces in accordance with Section 2.7.2.2 of ASCE 24.
   - 1.3. For dry floodproofed nonresidential buildings, *construction documents* shall include a statement that the dry floodproofing is designed in accordance with ASCE 24.
2. For construction in *coastal high hazard areas* and *coastal A zones*:
   - 2.1. The elevation of the bottom of the lowest horizontal structural member as required by the lowest floor elevation inspection in Section ((~~110.3.3~~)) 108.9.4 and for the final inspection in Section ((~~110.3.11.1~~)) 108.9.9.1.
   - 2.2. *Construction documents* shall include a statement that the building is designed in accordance with ASCE 24, including that the pile or column foundation and building or structure to be attached thereto is designed to be anchored to resist flotation, collapse and lateral movement due to the effects of wind and flood loads acting simultaneously on all building components, and other load requirements of Chapter 16.

2.3. For breakaway walls designed to have a resistance of more than 20 psf (0.96 kN/m^2) determined using allowable stress design, *construction documents* shall include a statement that the breakaway wall is designed in accordance with ASCE 24.

SECTION 1613
EARTHQUAKE LOADS

[S] 1613.1 Scope. Every structure, and portion thereof, including nonstructural components that are permanently attached to structures and their supports and attachments, shall be designed and constructed to resist the effects of earthquake motions in accordance with Chapters 11, 12, 13, 15, 17 and 18 of ASCE 7 as amended by Section 1613.4, as applicable. The *seismic design category* for a structure is permitted to be determined in accordance with Section 1613 or ASCE 7.

Exceptions:

1. Detached one- and two-family dwellings, assigned to *Seismic Design Category* A, B or C, or located where the mapped short-period spectral response acceleration, S_S, is less than 0.4 g.
2. The seismic force-resisting system of wood-frame buildings that conform to the provisions of Section 2308 are not required to be analyzed as specified in this section.
3. Agricultural storage structures intended only for incidental human occupancy.
4. Structures that require special consideration of their response characteristics and environment that are not addressed by this code or ASCE 7 and for which other regulations provide seismic criteria, such as vehicular bridges, electrical transmission towers, hydraulic structures, buried utility lines and their appurtenances and nuclear reactors.
5. References within ASCE 7 to Chapter 14 shall not apply, except as specifically required herein.

[S] 1613.1.1 Presubmittal conference. At least 60 days prior to submittal of a building permit application that contains the construction documents for any structural component of the building, the applicant shall arrange a presubmittal conference with the structural engineer of record and the *building official* to review the proposed building structural system when an alternate procedure is used under the provisions in Section 104.4 or 104.5. The purpose of the meeting is to obtain conceptual approval from the *building official* of the proposed structural system.

Note: Projects using non-linear response history analysis methods or using an alternative lateral force resisting system are subject to peer review in accordance with Section 1613.4.3, and ASCE 7 Sections 12.2.1.1 and 16.1.1. Peer reviews require lengthy lead time prior to permit application and issuance. Applicants should contact the building official prior to the start of structural design.

1613.2 Seismic ground motion values. Seismic ground motion values shall be determined in accordance with this section.

1613.2.1 Mapped acceleration parameters. The parameters S_S and S_1 shall be determined from the 0.2 and 1-second spectral response accelerations shown on Figures 1613.2.1(1) through 1613.2.1(8). Where S_1 is less than or equal to 0.04 and S_S is less than or equal to 0.15, the structure is permitted to be assigned *Seismic Design Category* A.

not more than one unit vertical in 12 units horizontal. Ballasted nonpenetrating systems shall be designed to resist sliding and uplift resulting from lateral and vertical forces as required by Section 1605, using a coefficient of friction determined by acceptable engineering principles. In structures assigned to *Seismic Design Category* C, D, E or F, ballasted nonpenetrating systems shall be designed to accommodate seismic displacement determined by nonlinear response-history or other approved analysis or shake-table testing, using input motions consistent with ASCE 7 lateral and vertical seismic forces for nonstructural components on roofs.

[W] 1613.4 Amendments to ASCE 7. The provisions of Section 1613.4 shall be permitted as an amendment to the relevant provisions of ASCE 7. The text of ASCE 7 shall be amended as indicated in Sections 1613.4.1 through 1613.4.2.

[W] 1613.4.1. Modify ASCE 7 Section 12.2.5.4 to read as follows:

12.2.5.4 Increased Structural Height Limit for Steel Eccentrically Braced Frames, Steel Special Concentrically Braced Frames, Steel Buckling-Restrained Braced Frames, Steel Special Plate Shear Walls, and Special Reinforced Concrete Shear Walls. The limits on height, h_n, in Table 12.2-1 are permitted to be increased from 160 ft (50 m) to 240 ft (75 m) for structures assigned to Seismic Design Categories D or E and from 100 ft (30 m) to 160 ft (50 m) for structures assigned to Seismic Design Category F, if all of the following are satisfied:

1. The structure shall not have an extreme torsional irregularity as defined in Table 12.3-1 (horizontal structural irregularity Type 1b).
2. The steel eccentrically braced frames, steel special concentrically braced frames, steel buckling-restrained braced frames, steel special plate shear walls or special reinforced concrete shear walls in any one plane shall resist no more than 60 percent of the total seismic forces in each direction, neglecting accidental torsional effects.
3. Where floor and roof diaphragms transfer forces from the vertical seismic force-resisting elements above the diaphragm to other vertical force-resisting elements below the diaphragm, these in plane transfer forces shall be amplified by the overstrength factor, Ω_o, for the design of the diaphragm flexure, shear, and collectors.
4. The earthquake force demands in foundation mat slabs, grade beams, and pile caps supporting braced frames and/or walls arranged to form a shear-resisting core shall be amplified by 2 for shear and 1.5 for flexure. The redundancy factor, ρ, applies and shall be the same as that used for the structure in accordance with Section 12.3.4.
5. The earthquake shear force demands in special reinforced concrete shear walls shall be amplified by the overstrength factor, Ω_o.

[W] 1613.4.2 ASCE 7 Section 12.6. Amend ASCE 7 Section 12.6 and Table 12.6-1 to read as follows:

12.6 ANALYSIS PROCEDURE SELECTION

12.6.1 Analysis procedure. The structural analysis required by Chapter 12 shall consist of one of the types permitted in Table 12.6-1, based on the structure's seismic design category, structural system, dynamic properties, and regularity, or with the approval of the authority having jurisdiction, an alternative generally accepted procedure is permitted to be used. The analysis procedure selected shall be completed in accordance with the requirements of the corresponding section referenced in Table 12.6-1.

[S] Table 12.6-1 Permitted Analytical Procedures				
Seismic Design Category	Structural Characteristics	Equivalent Lateral Force Procedure, Section 12.8[a]	Modal Response Spectrum Analysis, Section 12.9, or Linear Response History Analysis, Section 12.9.2[a]	Nonlinear Response History Procedures, Chapter 16[a]
B, C	All structures	P	P	P
D, E, F	Risk Category I or II buildings not exceeding two *stories* above the base	P	P	P
	Structures of light frame construction	P	P	P
	Structures with no structural irregularities and not exceeding 160 ft in structural height	P	P	P
	Structures exceeding 160 ft in structural height[b] with no structural irregularities and with $T < 3.5T_s$	P	P	P
	Structures not exceeding 160 ft in structural height[b] and having only horizontal irregularities of Type 2, 3, 4, or 5 in Table 12.3-1 or vertical irregularities of Type 4, 5a, or 5b in Table 12.3-2	P	P	P
	All other structures ≤ 240 ft in height[b]	NP	P	P
	All structures > 240 ft in height[b]	NP	NP	P

[a] P: Permitted; NP: Not Permitted; $T_s = S_{D1}/S_{DS}$
[b] The structural height may be increased as allowed under rules promulgated by the building official.

Note: Building designs using non-linear response history procedures must undergo an independent structural review (peer review) in accordance with ASCE 7 Section 16.1.1.

SECTION 1614
ATMOSPHERIC ICE LOADS

1614.1 General. Ice-sensitive structures shall be designed for atmospheric ice loads in accordance with Chapter 10 of ASCE 7.

SECTION 1615
TSUNAMI LOADS

1615.1 General. The design and construction of Risk Category III and IV buildings and structures located in the Tsunami Design Zones defined in the Tsunami Design Geodatabase shall be in accordance with Chapter 6 of ASCE 7, except as modified by this code.

SECTION 1616
STRUCTURAL INTEGRITY

1616.1 General. *High-rise buildings* that are assigned to *Risk Category* III or IV shall comply with the requirements of Section 1616.2 if they are frame structures, or Section 1616.3 if they are bearing wall structures.

1616.2 Frame structures. Frame structures shall comply with the requirements of this section.

1616.2.1 Concrete frame structures. Frame structures constructed primarily of reinforced or prestressed concrete, either cast-in-place or precast, or a combination of these, shall conform to the requirements of Section 4.10 of ACI 318. Where ACI 318 requires that nonprestressed reinforcing or prestressing steel pass through the region bounded by the longitudinal column reinforcement, that reinforcing or prestressing steel shall have a minimum nominal tensile strength equal to two-thirds of the required one-way vertical strength of the connection of the floor or roof system to the column in each direction of beam or slab reinforcement passing through the column.

Exception: Where concrete slabs with continuous reinforcement having an area not less than 0.0015 times the concrete area in each of two orthogonal directions are present and are either monolithic with or equivalently bonded to beams, girders or columns, the longitudinal reinforcing or prestressing steel passing through the column reinforcement shall have a nominal tensile strength of one-third of the required one-way vertical strength of the connection of the floor or roof system to the column in each direction of beam or slab reinforcement passing through the column.

1616.2.2 Structural steel, open web steel joist or joist girder, or composite steel and concrete frame structures. Frame structures constructed with a structural steel frame or a frame composed of open web steel joists, joist girders with or without

CHAPTER 17

SPECIAL INSPECTIONS AND TESTS

User notes:

About this chapter: *Chapter 17 provides a variety of procedures and criteria for testing materials and assemblies, and labeling materials and assemblies. Its key purposes are to establish where additional inspections/observations and testing must be provided, and the submittals and verifications that must be provided to the building official. This chapter expands on the inspections of Chapter 1 by requiring special inspection by a qualified individual where indicated and, in some cases, structural observation by a registered design professional. Quality assurance measures that verify proper assembly of structural components and the suitability of the installed materials are intended to provide a building that, once constructed, complies with the minimum structural and fire-resistance code requirements as well as the approved design. To determine this compliance often requires frequent inspections and testing at specific stages of construction.*

Code development reminder: *Code change proposals to sections preceded by the designation [BF] will be considered by the IBC—Fire Safety Code Development Committee during the 2018 (Group A) Code Development Cycle. Sections preceded by the designation [F] will be considered by the International Fire Code Development Committee during the 2018 (Group A) Code Development Cycle. All other code change proposals will be considered by the IBC—Structural Code Development Committee during the Group B cycle. See explanation on page iv.*

SECTION 1701
GENERAL

1701.1 Scope. The provisions of this chapter shall govern the quality, workmanship and requirements for materials covered. Materials of construction and tests shall conform to the applicable standards listed in this code.

SECTION 1702
NEW MATERIALS

1702.1 General. New building materials, equipment, appliances, systems or methods of construction not provided for in this code, and any material of questioned suitability proposed for use in the construction of a building or structure, shall be subjected to the tests prescribed in this chapter and in the approved rules to determine character, quality and limitations of use.

SECTION 1703
APPROVALS

[S] 1703.1 Approved agency. Whenever tests or certification of any material or fabricated assembly are required by this code, the tests or certification shall be made by an agency approved by the *building official* to conduct the tests or provide the certification. The *building official* is authorized to establish rules and regulations setting forth conditions and provisions for approval of agencies and for the conduct of any agency so approved. An approved agency shall provide all information as necessary for the *building official* to determine that the agency meets the applicable requirements specified in Sections 1703.1.1 through 1703.1.3. The *building official* is authorized to suspend or revoke approval of an agency upon evidence of failure of the agency to properly conduct any test, certify any material, or to perform any inspection in a manner required by this code.

1703.1.1 Independence. An *approved agency* shall be objective, competent and independent from the contractor responsible for the work being inspected. The agency shall disclose to the *building official* and the *registered design professional in responsible charge* possible conflicts of interest so that objectivity can be confirmed.

1703.1.2 Equipment. An *approved agency* shall have adequate equipment to perform required tests. The equipment shall be periodically calibrated.

[S] 1703.1.3 Personnel. An *approved agency* shall employ experienced personnel educated in conducting, supervising and evaluating tests and *special inspections*. Unless otherwise *approved* by the *building official*, all *special inspectors* shall be registered with the Washington Association of Building Officials. A registered civil or structural engineer or registered architect is permitted to serve as a *special inspector* when approved by the *building official.*

[S] 1703.1.4 Approval of tests and inspections. *Special inspectors* and inspection and testing agencies shall not conduct any inspections or tests until the *building official* has authorized the inspection or test in writing. The *special inspectors* or inspection/testing agency approved by the *building official* shall not be changed without obtaining prior approval of the *registered design professional in responsible charge* or the owner, and the *building official.*

((~~**1703.2 Written approval.** Any material, appliance, equipment, system or method of construction meeting the requirements of this code shall be *approved* in writing after satisfactory completion of the required tests and submission of required test reports.~~

~~**1703.3 Record of approval.** For any material, appliance, equipment, system or method of construction that has been *approved*, a record of such approval, including the conditions and limitations of the approval, shall be kept on file in the *building official's* office and shall be available for public review at appropriate times.~~))

1703.4 Performance. Specific information consisting of test reports conducted by an *approved* agency in accordance with the appropriate referenced standards, or other such information as necessary, shall be provided for the *building official* to determine that the product, material or assembly meets the applicable code requirements.

[S] 1703.4.1 Research and investigation. ((~~Sufficient~~)) If *approved* by the *building official*, technical data shall be submitted to the *building official* to substantiate the proposed use of any product, material or assembly. If it is determined that the evidence submitted is satisfactory proof of performance for the use intended, the *building official* shall approve the use of the product, material or assembly subject to the requirements of this code. The costs, reports and investigations required under these provisions shall be paid by the owner or the owner's authorized agent.

1703.4.2 Research reports. Supporting data, where necessary to assist in the approval of products, materials or assemblies not specifically provided for in this code, shall consist of valid research reports from *approved* sources.

1703.5 Labeling. Products, materials or assemblies required to be *labeled* shall be *labeled* in accordance with the procedures set forth in Sections 1703.5.1 through 1703.5.4.

1703.5.1 Testing. An *approved agency* shall test a representative sample of the product, material or assembly being *labeled* to the relevant standard or standards. The *approved agency* shall maintain a record of the tests performed. The record shall provide sufficient detail to verify compliance with the test standard.

1703.5.2 Inspection and identification. The *approved agency* shall periodically perform an inspection, which shall be in-plant if necessary, of the product or material that is to be *labeled*. The inspection shall verify that the labeled product, material or assembly is representative of the product, material or assembly tested.

1703.5.3 Label information. The *label* shall contain the manufacturer's identification, model number, serial number or definitive information describing the performance characteristics of the product, material or assembly and the *approved agency's* identification.

1703.5.4 Method of labeling. Information required to be permanently identified on the product, material or assembly shall be acid etched, sand blasted, ceramic fired, laser etched, embossed or of a type that, once applied, cannot be removed without being destroyed.

1703.6 Evaluation and follow-up inspection services. Where structural components or other items regulated by this code are not visible for inspection after completion of a prefabricated assembly, the owner or the owner's authorized agent shall submit a report of each prefabricated assembly. The report shall indicate the complete details of the assembly, including a description of the assembly and its components, the basis upon which the assembly is being evaluated, test results and similar information and other data as necessary for the *building official* to determine conformance to this code. Such a report shall be *approved* by the *building official*.

1703.6.1 Follow-up inspection. The owner or the owner's authorized agent shall provide for *special inspections* of fabricated items in accordance with Section 1704.2.5.

1703.6.2 Test and inspection records. Copies of necessary test and *special inspection* records shall be filed with the building official.

[S] 1703.7 Preconstruction conference. For projects requiring *special inspection*, the owner or the owner's agent shall arrange a conference with the project contractor, the design team, the *special inspection* agency and the *building official* prior to commencing work on any portion of construction requiring *special inspection*. The purpose of the conference is to identify and clarify the *special inspection* requirements of the project.

[S] 1703.8 Revocation of registration or approval to inspect. The *building official* is authorized to revoke, suspend or refuse to renew registration or approval of inspection agencies, *special inspectors* and nonregistered *special inspectors*, including inspectors registered by the Washington Association of Building Officials. This may be done upon evidence submitted to the *building official* of incompetence, of willful or negligent failure to observe or report violations of the *Seattle Building Code* or of any other failure to perform properly and effectively the duties required by this code or other duties assumed by an inspection agency or nonregistered *special inspector*. The inspection agency or *special inspector* shall be notified in writing of the *building official*'s decision to revoke, suspend or refuse to renew registration or approval. The notice shall be served in the manner set forth in RCW 4.28.080 for service of a summons or sent by first class mail. For purposes of this section, service is complete at the time of personal service, or if mailed, three days after the date of mailing. When the last day of the period so computed is a Saturday, Sunday or City holiday, the period runs until 5 p.m. on the next business day.

[S] 1703.8.1 Review by the building official for revocation of registration. Any *person* aggrieved by a notice of revocation issued pursuant to Section 1703.8 may obtain a review of the notice by making a request in writing to the *building official* within three business days of the date of service of the notice of revocation.

[S] 1703.8.1.1 Review procedure. The review shall occur within five business days after receipt by the *building official* of the request for review unless otherwise agreed by the *person* requesting the review. Any *person* aggrieved by or interested in the notice of revocation may submit additional information to the *building official* for consideration as part of the review at any time prior to the review. The review will be made by a representative of the *building official* who will review all additional information received and may also request a site visit.

[S] 1703.8.1.2 Decision. After the review, the *building official* shall:

1. Sustain the notice of revocation and set or modify the date the revocation will take effect;
2. Withdraw the notice of revocation;
3. Continue the review to a date certain; or
4. Modify the notice of revocation and set or modify the date the revocation will take effect.

[S] 1703.8.1.3 Order. The *building official* shall issue an order containing the decision within ten days after the review is completed and shall cause the order to be sent by regular first class mail to the *persons* requesting the review, any other *person* on whom the notice of revocation was served and any other *person* who requested a copy before issuance of the order of the *building official*. The order of the *building official* is the final order of the City and all parties are bound by the final order.

SECTION 1704
SPECIAL INSPECTIONS AND TESTS, CONTRACTOR RESPONSIBILITY AND STRUCTURAL OBSERVATION

1704.1 General. Special inspections and tests, statements of special inspections, responsibilities of contractors, submittals to the *building official* and structural observations shall meet the applicable requirements of this section.

[S] 1704.2 Special inspections and tests. Where application is made to the *building official* for construction as specified in Section ((~~105~~)) 106, the owner or the owner's authorized agent, other than the contractor, shall employ one or more *approved agencies* to provide *special inspections* and tests during construction on the types of work specified in Section 1705 and identify the *approved agencies* to the *building official*. The *building official* may require additional *special inspectors* if the *building official* determines they are needed due to the magnitude or complexity of the job. These *special inspections* and tests are in addition to the inspections by the *building official* that are identified in Section ((~~110~~)) 108.

Exceptions:

1. *Special inspections* and tests are not required for construction of a minor nature or as warranted by conditions in the jurisdiction as *approved* by the *building official.*
2. Unless otherwise required by the *building official*, *special inspections* and tests are not required for Group U occupancies that are accessory to a residential occupancy including, but not limited to, those listed in Section 312.1.
3. *Special inspections* and tests are not required for portions of structures designed and constructed in accordance with the cold-formed steel light-frame construction provisions of Section 2211.1.2 or the conventional light-frame construction provisions of Section 2308.
4. The contractor is permitted to employ the *approved agencies* where the contractor is also the owner.

[S] 1704.2.1 Special inspector qualifications. Prior to the start of the construction, the *approved agencies* shall provide written documentation to the *building official* demonstrating the competence and relevant experience or training of the *special inspectors* who will perform the *special inspections* and tests during construction. Experience or training shall be considered to be relevant where the documented experience or training is related in complexity to the same type of *special inspection* or testing activities for projects of similar complexity and material qualities. Unless otherwise *approved* by the *building official*, all *special inspectors* shall be registered with the Washington Association of Building Officials. These qualifications are in addition to qualifications specified in other sections of this code.

The *registered design professional in responsible charge* and engineers of record involved in the design of the project are permitted to act as the *approved agency* and their personnel are permitted to act as special inspectors for the work designed by them, provided they qualify as special inspectors.

1704.2.1.1 Registration of special inspectors.

1704.2.1.1.1 Application for registration. Criteria for registration of *special inspectors* shall be established by the *building official* by rule.

1704.2.1.1.2 Issuance of certificate of registration. If the *building official* is satisfied that the applicant is qualified, a Certificate of Registration or a Limited Certificate of Registration shall be issued that specifies the types of inspection the applicant has been authorized to perform. Valid registration from the Washington Association of Building Officials is permitted to substitute for registration by the *building official*.

1704.2.1.1.3 Renewal of special inspector's registration. A Certificate of Registration or Limited Certificate of Registration is valid for the period of time to be determined by the *building official* by rule. Upon application for renewal of a Certificate of Registration, the *building official* is permitted to re-examine the applicant to ascertain his/her fitness to perform the inspection of the type or types for which the application was made.

1704.2.1.1.4 Revocation. *Special inspectors'* certifications are subject to revocation according to Section 1703.8.

[S] 1704.2.2 Access for special inspection. ((~~The~~)) It is the duty of the *person* requesting *special inspections* to provide that construction or work for which *special inspection* or testing is required ((~~shall remain~~)) is accessible and exposed for *special inspection* or testing purposes until completion of the required *special inspections* or tests.

1704.2.3 Statement of special inspections. The applicant shall submit a statement of *special inspections* ((~~in accordance with Section 107.1~~)) as a condition for permit issuance. This statement shall be in accordance with Section 1704.3.

Exception: A statement of *special inspections* is not required for portions of structures designed and constructed in accordance with the cold-formed steel light-frame construction provisions of Section 2211.1.2 or the conventional light-frame construction provisions of Section 2308.

((~~**1704.2.4 Report requirement.** *Approved agencies* shall keep records of special inspections and tests. The *approved agency* shall submit reports of *special* inspections and tests to the *building official* and to the *registered design professional in responsible charge*. Reports shall indicate that work inspected or tested was or was not completed in conformance to *approved construction documents*. Discrepancies shall be brought to the immediate attention of the contractor for correction. If they are not corrected, the discrepancies shall be brought to the attention of the *building official* and to the *registered design professional in responsible charge* prior to the completion of that phase of the work. A final report documenting required *special inspections* and tests, and correction of any discrepancies noted in the inspections or tests, shall be submitted at a point in time agreed upon prior to the start of work by the owner or the owner's authorized agent to the *building official*.~~))

[S] 1704.2.4 Responsibilities.

1704.2.4.1 Responsibilities of special inspector. The *special inspector* is responsible for conducting all *special inspections* for which the *special inspector* was employed and notified and for carrying out the duties of a *special inspector* as specified in Section 1704.

1704.2.4.1.1 Specific duties. Registered *special inspectors* are regularly authorized deputies of the *building official* and are subject to all duties imposed by the *building official*, in addition to the following:

1. The registered *special inspector* shall be present during the execution of all assigned work. The registered *special inspector* shall report to the job sufficiently in advance of construction to become familiar with the plans and to inspect all materials to be used or concealed within the work. The *special inspector* shall inspect the construction, erection, placing, or other use of materials; and shall observe whether there is compliance with the *approved* design as to all of the foregoing. During the execution of all assigned work, the registered *special inspector* shall not undertake or engage in any other task or occupation that interferes with the proper performance of the inspection duties.
2. The registered *special inspector* shall not approve the placing of foundation concrete or pile caps prior to the approval of the soil condition or pile driving reports by the engineer who performed the *special inspection* for the pile installation.
3. The registered *special inspector* shall be employed only by an *approved* inspection or testing agency.
4. The registered *special inspector* shall not inspect work performed, or material supplied, by any contractor, subcontractor or material vendor with whom the inspector is employed.
5. If any registered *special inspector* is negligent in the performance of the inspector's duties, the *building official* is permitted to stop the work.

1704.2.4.1.2 Daily reports. The registered *special inspector* shall immediately report all irregularities, substitution of materials and violations to the contractor for correction, then if uncorrected, to the *registered design professional in responsible charge* and to the *building official*. At the conclusion of each inspection, the registered *special inspector* shall submit a report to the *registered design professional in responsible charge* and owner relative to the portion of the work inspected, stating whether the work requiring *special inspection* was, to the best of the *special inspector's* knowledge, in conformance with the *approved* plans and specifications and the applicable workmanship provisions of this code and related standards. The report shall be signed by the registered *special inspector*. One copy of the report shall be submitted to the *building official* by the *approved* inspection or testing agency no later than one week from the date of the inspection and shall be filed in the records of the agency's office. One copy of the report shall be left at the job

site by the *special inspector*. The *special inspector* shall also provide, as directed by the *building official* or by the *registered design professional in responsible charge* or owner, such other information as is required during the *special inspector's* assigned employment.

1704.2.4.1.3 Final report. The inspection or testing agency shall submit a final signed report listing the scope of required inspection and stating whether all work requiring *special inspection* was, to the best of the agency's knowledge, inspected and reported as specified on *construction documents.*

1704.2.4.2 Responsibility of owner. The owner or an authorized agent is responsible for notifying the *special inspector* when construction activity is scheduled that requires *special inspection*. If the owner designates another *person* to notify the *special inspector*, the owner retains the responsibility to assure that the *special inspections* are conducted and required reports submitted to the *building official*. The *approved* testing agency shall notify the *building official* and the *registered design professional in responsible charge* or owner of the commencement of inspection of a job and shall specify the type of inspection for which the special inspector has been engaged. This notification shall be made prior to commencement of inspection. The *approved* testing agency shall notify the *building official* prior to commencement of each day's inspection thereafter. The *building official* is permitted to require that every request for *special inspection* be filed at least one working day before the *special inspection* is desired. The request shall be made in writing or by telephone at the option of the *building official.*

1704.2.4.3 Posting special inspection record. The *building official* is permitted to require that work requiring *special inspection* not be commenced until the permit holder or the permit holder's agent posts an inspection log in a conspicuous place on the premises. The record shall be posted in a position which allows the *special inspector* to conveniently enter his/her identification, the date, and type of inspection performed. This record shall be maintained there by the permit holder until final approval has been granted by the *building official.*

[S] 1704.2.5 Special inspection of fabricated items. Where fabrication of structural, load-bearing or lateral load-resisting members or assemblies is being conducted on the premises of a fabricator's shop, *special inspections* of the *fabricated items* shall be performed during fabrication, except where the fabricator has been approved to perform work without special inspections in accordance with Section 1704.2.5.1. *Special inspection*s are not required for steel members and assemblies produced by fabricators that are registered in the Washington Association of Building Officials (WABO) Steel Fabricator Registration Program.

Note: The City of Seattle does not register fabricators for products that are within the scope of the WABO registration program.

1704.2.5.1 Fabricator approval. *Special inspections* during fabrication are not required where the work is done on the premises of a fabricator approved according to the provisions of this chapter to perform such work without *special inspection.* ((~~Approval shall be based on review of the fabricator's written fabrication procedures and quality control manuals that provide a basis for control of materials and workmanship, with periodic auditing of fabrication and quality control practices by an *approved agency* or the *building official.* At completion of fabrication, the *approved* fabricator shall submit a *certificate of compliance* to the owner or the owner's authorized agent for submittal to the *building official* as specified in Section 1704.5 stating that the work was performed in accordance with the *approved construction documents.*~~))

1704.2.5.1.1 Application for registration. Application for registration as an *approved* fabricator shall be made to the *building official* by plants engaged in the manufacture of:

1. Prestressed or precast concrete structural products, and premixed concrete.
2. Unit masonry products.
3. Engineered wood products.
4. Prefabricated or assembly-line-produced metal products.
5. Other prefabricated products as the *building official* designates.

1704.2.5.1.2 Requirements for registration. The *building official* is authorized to examine manufacturing plants that submit applications for registration and shall issue certificates of registration if the plants have complied with the following requirements:

1. Develop and submit a detailed fabrication procedural manual reflecting key quality control procedures that will provide a basis for inspection control of the fabricating process.
2. Have the fabricator's quality control capabilities, operation of equipment and personnel as outlined in the fabrication procedural manual verified by an *approved* inspection or quality control agency.
3. Agree to have periodic plant inspections conducted by an approved inspection or quality control agency to monitor the effectiveness of the quality control program and to allow unannounced audits of the plant by the *building official.*

4. Agree to require the inspection or quality control agency to notify the *building official* in writing of any changes to the procedural manual.
5. Agree to submit a Certificate of Compliance, if required by the *building official*, that work was performed in accordance with the *approved* plans and specifications to the *building official* and to the *registered design professional in responsible charge*.
6. Pay a registration fee determined by the *building official* in accordance with provisions of the *Fee Subtitle*.

1704.2.5.1.3 Review by the building official for denial of registration of fabricators. The fabricator may request in writing a review before the *building official* to reconsider the decision to deny registration. The request shall be filed in writing with the *building official*.

1704.2.5.1.3.1 Review procedure. The review shall occur no later than 15 working days from receipt of the written request unless otherwise agreed by the *person* requesting the review. Any *person* affected by the decision to deny registration may submit additional information to the *building official* for consideration as part of the review at any time prior to the review. The review will be made by a representative of the *building official* who will review all additional information received. The reviewer may request clarification of the information and a site visit.

1704.2.5.1.3.2 Decision. After the review, the *building official* shall:

1. Sustain the denial of registration;
2. Withdraw the denial of registration;
3. Modify the decision to deny registration; or
4. Continue the review to a date certain.

1704.2.5.1.3.3 Order. The *building official* shall issue an order within ten days after the review is completed and shall send it by regular first class mail to the *person* or *persons* requesting the review and any other *person* who requested a copy.

1704.2.5.1.4 Renewal of registration. Registration of *approved* fabricators is valid for one year from the date of issuance and is subject to renewal annually. Registration may be renewed upon application, contingent on compliance with quality control procedures during the past year and payment of a fee in accordance with provisions of the *Fee Subtitle*. The *building official* is authorized to revoke registration for cause.

1704.2.5.1.5 Fees. Fees for examination and registration of *special inspectors* are determined by the *building official* in accordance with the *Fee Subtitle*.

1704.3 Statement of special inspections. Where *special inspections* or tests are required by Section 1705, the *registered design professional in responsible charge* shall prepare a statement of *special inspections* in accordance with Section 1704.3.1 for submittal by the applicant in accordance with Section 1704.2.3.

Exception: The statement of *special inspections* is permitted to be prepared by a qualified person *approved* by the *building official* for construction not designed by a *registered design professional*.

[S] 1704.3.1 Content of statement of special inspections. The statement of *special inspections* shall identify the following:

1. The materials, systems, components and work required to have *special inspections* or tests by the *building official* or by the *registered design professional* responsible for each portion of the work.
2. The type and extent of each *special inspection*, if required by the *building official*.
3. The type and extent of each test, if required by the *building official*.
4. Additional requirements for *special inspections* or tests for seismic or wind resistance as specified in Sections 1705.11, 1705.12 and 1705.13.
5. For each type of *special inspection*, identification as to whether it will be continuous *special inspection*, periodic *special inspection* or performed in accordance with the notation used in the referenced standard where the inspections are defined.

1704.3.2 Seismic requirements in the statement of special inspections. Where Section 1705.12 or 1705.13 specifies *special inspections* or tests for seismic resistance, the statement of *special inspections* shall identify the designated seismic systems and seismic force-resisting systems that are subject to the *special inspections* or tests.

1704.3.3 Wind requirements in the statement of special inspections. Where Section 1705.11 specifies *special inspection* for wind resistance, the statement of *special inspections* shall identify the main windforce-resisting systems and wind-resisting components that are subject to *special inspections*.

[S] ((~~1704.4 Contractor responsibility.~~ ~~Each contractor responsible for the construction of a main wind- or seismic force-resisting system, designated seismic system or a wind- or seismic force-resisting component listed in the statement of special inspections shall submit a written statement of responsibility to the *building official* and the owner or the owner's authorized agent prior to the commencement of work on the system or component. The contractor's statement of responsibility shall contain acknowledgement of awareness of the special requirements contained in the statement of *special inspections*.~~))

1704.5 Submittals to the building official. In addition to the submittal of reports of *special inspections* and tests in accordance with Section 1704.2.4, reports and certificates shall be submitted by the owner or the owner's authorized agent to the *building official* for each of the following:

1. *Certificates of compliance* for the fabrication of structural, load-bearing or lateral load-resisting members or assemblies on the premises of an *approved fabricator* in accordance with Section 1704.2.5.1.
2. *Certificates of compliance* for the seismic qualification of nonstructural components, supports and attachments in accordance with Section 1705.13.2.
3. *Certificates of compliance* for *designated seismic systems* in accordance with Section 1705.13.3.
4. Reports of preconstruction tests for shotcrete in accordance with Section 1908.5.
5. *Certificates of compliance* for open web steel joists and joist girders in accordance with Section 2207.5.
6. Reports of material properties verifying compliance with the requirements of AWS D1.4 for weldability as specified in Section 26.6.4 of ACI 318 for reinforcing bars in concrete complying with a standard other than ASTM A706 that are to be welded.
7. Reports of mill tests in accordance with Section 20.2.2.5 of ACI 318 for reinforcing bars complying with ASTM A615 and used to resist earthquake-induced flexural or axial forces in the special moment frames, special structural walls or coupling beams connecting special structural walls of *seismic force-resisting systems* in *structures* assigned to *Seismic Design Category* B, C, D, E or F.

[S] 1704.6 Structural observations. Where required by the provisions of Section 1704.6.1, 1704.6.2 or 1704.6.3, the owner or the owner's authorized agent shall employ a *registered design professional* to perform structural observations. Structural observation does not include or waive the responsibility for the inspections in Section ((~~110~~)) 108 or the *special inspections* in Section 1705 or other sections of this code.

Prior to the commencement of observations, the structural observer shall submit to the *building official* a written statement identifying the frequency and extent of structural observations.

At the conclusion of the work included in the permit, the structural observer shall submit to the *building official* a written statement that the site visits have been made and identify any reported deficiencies that, to the best of the structural observer's knowledge, have not been resolved.

1704.6.1 Structural observations for structures. Structural observations shall be provided for those structures where one or more of the following conditions exist:

1. The structure is classified as *Risk Category IV*.
2. The structure is a *high-rise building*.
3. Such observation is required by the *registered design professional* responsible for the structural design.
4. The structure includes five *stories* of wood-frame construction.

((~~4~~)) 5. Such observation is specifically required by the *building official*.

1704.6.2 Structural observations for seismic resistance. Structural observations shall be provided for those structures assigned to *Seismic Design Category* D, E or F where one or more of the following conditions exist:

1. The structure is classified as *Risk Category* III or IV.
2. The structure is assigned to *Seismic Design Category* E, is classified as *Risk Category* I or II, and is greater than two *stories above* the *grade plane*.

1704.6.3 Structural observations for wind resistance. Structural observations shall be provided for those structures sited where *V* is 130 mph (58 m/sec) or greater and the structure is classified as *Risk Category* III or IV.

SECTION 1705
REQUIRED SPECIAL INSPECTIONS AND TESTS

1705.1 General. *Special inspections* and tests of elements and nonstructural components of buildings and structures shall meet the applicable requirements of this section.

1705.1.1 Special cases. *Special inspections* and tests shall be required for proposed work that is, in the opinion of the building official, unusual in its nature, such as, but not limited to, the following examples:

1. Construction materials and systems that are alternatives to materials and systems prescribed by this code.
2. Unusual design applications of materials described in this code.
3. Materials and systems required to be installed in accordance with additional manufacturer's instructions that prescribe requirements not contained in this code or in standards referenced by this code.

[S] 1705.2 Steel construction. The *special inspections* and nondestructive testing of steel construction in buildings, structures, and portions thereof shall be in accordance with this section.

Exception: *Special inspections* of the steel fabrication process shall not be required where the fabrication process for the entire building or structure does not include any welding, thermal cutting or heating operation of any kind. ((~~In such cases, the fabricator shall be required to submit a detailed procedure for material control that demonstrates the fabricator's ability to maintain suitable records and procedures such that, at any time during the fabrication process, the material specification and grade for the main stress-carrying elements are capable of being determined. Mill test reports shall be identifiable to the main stress-carrying elements where required by the *approved construction documents*.~~))

1705.2.1 Structural steel. *Special inspections* and nondestructive testing of *structural steel elements* in buildings, structures and portions thereof shall be in accordance with the quality assurance inspection requirements of AISC 360.

Exception: *Special inspection* of railing systems composed of *structural steel elements* shall be limited to welding inspection of welds at the base of cantilevered rail posts.

1705.2.2 Cold-formed steel deck. *Special inspections* and qualification of welding special inspectors for cold-formed steel floor and roof deck shall be in accordance with the quality assurance inspection requirements of SDI QA/QC.

1705.2.3 Open-web steel joists and joist girders. *Special inspections* of open-web steel joists and joist girders in buildings, structures and portions thereof shall be in accordance with Table 1705.2.3.

TABLE 1705.2.3
REQUIRED SPECIAL INSPECTIONS OF OPEN-WEB STEEL JOISTS AND JOIST GIRDERS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION	REFERENCED STANDARD[a]
1. Installation of open-web steel joists and joist girders.			
a. End connections – welding or bolted.	—	X	SJI specifications listed in Section 2207.1.
b. Bridging – horizontal or diagonal.	—	—	—
1. Standard bridging.	—	X	SJI specifications listed in Section 2207.1.
2. Bridging that differs from the SJI specifications listed in Section 2207.1.	—	X	—

For SI: 1 inch = 25.4 mm.
a. Where applicable, see Section 1705.12, Special inspections for seismic resistance.

1705.2.4 Cold-formed steel trusses spanning 60 feet or greater. Where a cold-formed steel truss clear span is 60 feet (18 288 mm) or greater, the special inspector shall verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the *approved* truss submittal package.

1705.3 Concrete construction. *Special inspections* and tests of concrete construction shall be performed in accordance with this section and Table 1705.3.

Exception: *Special inspections* and tests shall not be required for:

1. Isolated spread concrete footings of buildings three stories or less above *grade plane* that are fully supported on earth or rock.
2. Continuous concrete footings supporting walls of buildings three stories or less above *grade plane* that are fully supported on earth or rock where:
   - 2.1. The footings support walls of light-frame construction.
   - 2.2. The footings are designed in accordance with Table 1809.7.
   - 2.3. The structural design of the footing is based on a specified compressive strength, f'_c, not more than 2,500 pounds per square inch (psi) (17.2 MPa), regardless of the compressive strength specified in the *approved construction documents* or used in the footing construction.
3. Nonstructural concrete slabs supported directly on the ground, including prestressed slabs on grade, where the effective prestress in the concrete is less than 150 psi (1.03 MPa).

4. Concrete foundation walls constructed in accordance with Table 1807.1.6.2.
5. Concrete patios, driveways and sidewalks, on grade.

[S] TABLE 1705.3
REQUIRED SPECIAL INSPECTIONS AND TESTS OF CONCRETE CONSTRUCTION

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION	REFERENCED STANDARD[a]	IBC REFERENCE
1. Inspect reinforcement, including prestressing tendons, and verify placement.	—	X	ACI 318: Ch. 20, 25.2, 25.3, 26.6.1-26.6.3	1908.4
2. Reinforcing bar welding: a. Verify weldability of reinforcing bars other than ASTM A706; b. Inspect single-pass fillet welds, maximum 5/16″; and c. Inspect all other welds.	— X	X X	AWS D1.4 ACI 318: 26.6.4	—
3. Inspect anchors cast in concrete.	—	X	ACI 318: 17.8.2	—
4. Inspect anchors post-installed in hardened concrete members.[b] a. Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads. b. Mechanical anchors and adhesive anchors not defined in 4.a.	 X	 X	 ACI 318: 17.8.2.4 ACI 318: 17.8.2	—
5. Verify use of required design mix.	—	X	ACI 318: Ch. 19, 26.4.3, 26.4.4	1904.1, 1904.2, 1908.2, 1908.3
6. Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	X	—	ASTM C172 ASTM C31 ACI 318: 26.5, 26.12	1908.10
7. Inspect concrete and shotcrete placement for proper application techniques.	X	—	ACI 318: 26.5	1908.6, 1908.7, 1908.8
8. Verify maintenance of specified curing temperature and techniques.	—	X	ACI 318: 26.5.3-26.5.5	1908.9
9. Inspect prestressed concrete for: a. Application of prestressing forces; and b. Grouting of bonded prestressing tendons.	 X X	 — —	ACI 318: 26.10	—
10. Inspect erection of precast concrete members.	—	X	ACI 318: 26.9	—
11. Verify in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs.	—	X	ACI 318: 26.11.2	—
12. Inspect formwork for general conformity to approved plans for size and shape, ((~~location and dimensions~~)) of the concrete member being formed.	—	X	ACI 318: 26.11.1.2(b)	—

For SI: 1 inch = 25.4 mm.

a. Where applicable, see Section 1705.12, Special inspections for seismic resistance.

b. Specific requirements for special inspection shall be included in the research report for the anchor issued by an approved source in accordance with 17.8.2 in ACI 318, or other qualification procedures. Where specific requirements are not provided, special inspection requirements shall be specified by the registered design professional and shall be approved by the building official prior to the commencement of the work.

1705.3.1 Welding of reinforcing bars. *Special inspections* of welding and qualifications of *special inspectors* for reinforcing bars shall be in accordance with the requirements of AWS D1.4 for *special inspection* and of AWS D1.4 for special inspector qualification.

1705.3.2 Material tests. In the absence of sufficient data or documentation providing evidence of conformance to quality standards for materials in Chapters 19 and 20 of ACI 318, the *building official* shall require testing of materials in accordance with the appropriate standards and criteria for the material in Chapters 19 and 20 of ACI 318.

1705.3.3 Inspection during concrete mixing. *Special inspections* are required during mixing of concrete under one of the following circumstances:

1. Concrete mixes prepared in a batch plant that is not certified by The City of Seattle;
2. All structural lightweight concrete mixes;
3. Concrete mixes with f'_c greater than 6000 psi (41.4 Mpa);
4. Concrete mixes containing alternative materials addressed in Section 1705.3.2; or
5. Other unusual circumstances as determined by the *building official.*

Exception: Inspection during the mixing of concrete is not required if the proportions of ingredients are established in accordance with Table 1905.1.10 or if a mix has been granted continuous approval by the *building official.*

1705.4 Masonry construction. *Special inspections* and tests of masonry construction shall be performed in accordance with the quality assurance program requirements of TMS 402 and TMS 602.

Exception: *Special inspections* and tests shall not be required for:

1. Empirically designed masonry, glass unit masonry or masonry veneer designed in accordance with Section 2109, 2110 or Chapter 14, respectively, where they are part of a structure classified as *Risk Category* I, II or III.
2. Masonry foundation walls constructed in accordance with Table 1807.1.6.3(1), 1807.1.6.3(2), 1807.1.6.3(3) or 1807.1.6.3(4).
3. Masonry fireplaces, masonry heaters or masonry chimneys installed or constructed in accordance with Section 2111, 2112 or 2113, respectively.

1705.4.1 Empirically designed masonry, glass unit masonry and masonry veneer in Risk Category IV. *Special inspections* and tests for empirically designed masonry, glass unit masonry or masonry veneer designed in accordance with Section 2109, 2110 or Chapter 14, respectively, where they are part of a structure classified as *Risk Category* IV shall be performed in accordance with TMS 602, Level 2.

1705.4.2 Vertical masonry foundation elements. *Special inspections* and tests of *vertical masonry foundation elements* shall be performed in accordance with Section 1705.4.

1705.5 Wood construction. *Special inspections* of prefabricated wood structural elements and assemblies shall be in accordance with Section 1704.2.5. *Special inspections* of site-built assemblies shall be in accordance with this section.

1705.5.1 High-load diaphragms. High-load diaphragms designed in accordance with Section 2306.2 shall be installed with *special inspections* as indicated in Section 1704.2. The special inspector shall inspect the wood structural panel sheathing to ascertain whether it is of the grade and thickness shown on the *approved construction documents*. Additionally, the special inspector must verify the nominal size of framing members at adjoining panel edges, the nail or staple diameter and length, the number of fastener lines and that the spacing between fasteners in each line and at edge margins agrees with the *approved construction documents.*

[S] 1705.5.2 Metal-plate-connected wood trusses. ((~~spanning 60 feet or greater.~~)) Special inspections of wood trusses with overall heights of 60 inches (1524 mm) or greater shall be performed to verify that the installation of the permanent individual truss member restraint/bracing has been installed in accordance with the approved truss submittal package. ((~~Where a truss~~)) For wood trusses with a clear span ((~~is~~)) of 60 feet (18 288 mm) or greater, the special inspector shall verify during construction that the temporary installation restraint/bracing ((~~and the permanent individual truss member restraint/bracing are~~)) is installed in accordance with the approved truss submittal package.

1705.5.2 Metal-plate-connected wood trusses spanning 60 feet or greater. Where a truss clear span is 60 feet (18 288 mm) or greater, the special inspector shall verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.

[W] 1705.5.3 Mass timber construction. *Special inspections* of *mass timber* elements in Types IV-A, IV-B, and IV-C construction shall be in accordance with Table 1705.5.3.

[W] TABLE 1705.5.3
REQUIRED SPECIAL INSPECTIONS OF MASS TIMBER CONSTRUCTION

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. Inspection of anchorage and connections of mass timber construction to timber deep foundation systems.		X
2. Inspect erection and sequence of mass timber construction.		X
3. Inspection of connections where installation methods are required to meet design loads.		
3.1. Threaded fasteners.		
3.1.1. Verify use of proper installation equipment.		X
3.1.2. Verify use of predrilled holes where required.		X

[W] TABLE 1705.5.3
REQUIRED SPECIAL INSPECTIONS OF MASS TIMBER CONSTRUCTION

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
3.1.3. Inspect screws, including diameter, length, head type, spacing, installation angle, and depth.		X
3.2. Adhesive anchors installed in horizontal or upwardly inclined orientation to resist sustained tension loads.	X	
3.3. Adhesive anchors not defined in 3.2.		X
3.4. Bolted connections.		X
3.5. Concealed connection.		X

1705.6 Soils. *Special inspections* and tests of existing site soil conditions, fill placement and load-bearing requirements shall be performed in accordance with this section and Table 1705.6. The *approved* geotechnical report and the *construction documents* prepared by the *registered design professionals* shall be used to determine compliance. During fill placement, the special inspector shall verify that proper materials and procedures are used in accordance with the provisions of the *approved* geotechnical report.

Exception: Where Section 1803 does not require reporting of materials and procedures for fill placement, the special inspector shall verify that the in-place dry density of the compacted fill is not less than 90 percent of the maximum dry density at optimum moisture content determined in accordance with ASTM D1557.

TABLE 1705.6
REQUIRED SPECIAL INSPECTIONS AND TESTS OF SOILS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. Verify materials below shallow foundations are adequate to achieve the design bearing capacity.	—	X
2. Verify excavations are extended to proper depth and have reached proper material.	—	X
3. Perform classification and testing of compacted fill materials.	—	X
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill.	X	—
5. Prior to placement of compacted fill, inspect subgrade and verify that site has been prepared properly.	—	X

1705.7 Driven deep foundations. *Special inspections* and tests shall be performed during installation of driven deep foundation elements as specified in Table 1705.7. The approved geotechnical report and the *construction documents* prepared by the *registered design professionals* shall be used to determine compliance.

TABLE 1705.7
REQUIRED SPECIAL INSPECTIONS AND TESTS OF DRIVEN DEEP FOUNDATION ELEMENTS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. Verify element materials, sizes and lengths comply with the requirements.	X	—
2. Determine capacities of test elements and conduct additional load tests, as required.	X	—
3. Inspect driving operations and maintain complete and accurate records for each element.	X	—
4. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and document any damage to foundation element.	X	—
5. For steel elements, perform additional special inspections in accordance with Section 1705.2.	—	—
6. For concrete elements and concrete-filled elements, perform tests and additional special inspections in accordance with Section 1705.3.	—	—
7. For specialty elements, perform additional inspections as determined by the registered design professional in responsible charge.	—	—

1705.8 Cast-in-place deep foundations. *Special inspections* and tests shall be performed during installation of cast-in-place deep foundation elements as specified in Table 1705.8. The *approved* geotechnical report and the *construction documents* prepared by the *registered design professionals* shall be used to determine compliance.

TABLE 1705.8
REQUIRED SPECIAL INSPECTIONS AND TESTS OF CAST-IN-PLACE DEEP FOUNDATION ELEMENTS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. Inspect drilling operations and maintain complete and accurate records for each element.	X	—
2. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes.	X	—
3. For concrete elements, perform tests and additional special inspections in accordance with Section 1705.3.	—	—

1705.9 Helical pile foundations. *Continuous special inspections* shall be performed during installation of helical pile foundations. The information recorded shall include installation equipment used, pile dimensions, tip elevations, final depth, final installation torque and other pertinent installation data as required by the *registered design professional in responsible charge*. The *approved* geotechnical report and the *construction documents* prepared by the *registered design professional* shall be used to determine compliance.

1705.10 Fabricated items. *Special inspections* of *fabricated items* shall be performed in accordance with Section 1704.2.5.

1705.11 Special inspections for wind resistance. *Special inspections* for wind resistance specified in Sections 1705.11.1 through 1705.11.3, unless exempted by the exceptions to Section 1704.2, are required for buildings and structures constructed in the following areas:

1. In wind Exposure Category B, where V_{asd} as determined in accordance with Section 1609.3.1 is 120 miles per hour (52.8 m/sec) or greater.
2. In wind Exposure Category C or D, where V_{asd} as determined in accordance with Section 1609.3.1 is 110 mph (49 m/sec) or greater.

[W] 1705.11.1 Structural wood. *Continuous special inspection* is required during field gluing operations of elements of the main windforce-resisting system. *Periodic special inspection* is required for nailing, bolting, anchoring and other fastening of elements of the main windforce-resisting system, including wood shear walls, wood diaphragms, drag struts, braces and hold-downs.

Exception: *Special inspections* are not required for wood shear walls, shear panels and diaphragms, including nailing, bolting, anchoring and other fastening to other elements of the main windforce-resisting system, where the ((~~specified~~)) lateral resistance is provided by sheathing of wood structural panels, and the fastener spacing ((~~at panel edges~~)) of the sheathing is more than 4 inches (102 mm) on center.

1705.11.2 Cold-formed steel light-frame construction. *Periodic special inspection* is required for welding operations of elements of the main windforce-resisting system. *Periodic special inspection* is required for screw attachment, bolting, anchoring and other fastening of elements of the main windforce-resisting system, including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs.

Exception: *Special inspections* are not required for cold-formed steel light-frame shear walls and diaphragms, including screwing, bolting, anchoring and other fastening to components of the windforce resisting system, where either of the following applies:

1. The sheathing is gypsum board or fiberboard.
2. The sheathing is wood structural panel or steel sheets on only one side of the shear wall, shear panel or diaphragm assembly and the fastener spacing of the sheathing is more than 4 inches (102 mm) on center (o.c.).

1705.11.3 Wind-resisting components. *Periodic special inspection* is required for fastening of the following systems and components:

1. Roof covering, roof deck and roof framing connections.
2. Exterior wall covering and wall connections to roof and floor diaphragms and framing.

1705.12 Special inspections for seismic resistance. *Special inspections* for seismic resistance shall be required as specified in Sections 1705.12.1 through 1705.12.9, unless exempted by the exceptions of Section 1704.2.

Exception: The *special inspections* specified in Sections 1705.12.1 through 1705.12.9 are not required for structures designed and constructed in accordance with one of the following:

1. The structure consists of light-frame construction; the design spectral response acceleration at short periods, S_{DS}, as determined in Section 1613.2.4, does not exceed 0.5; and the *building height* of the structure does not exceed 35 feet (10 668 mm).

2. The seismic force-resisting system of the structure consists of reinforced masonry or reinforced concrete; the design spectral response acceleration at short periods, S_{DS}, as determined in Section 1613.2.4, does not exceed 0.5; and the *building height* of the structure does not exceed 25 feet (7620 mm).
3. The structure is a detached one- or two-family dwelling not exceeding two *stories above grade plane* and does not have any of the following horizontal or vertical irregularities in accordance with Section 12.3 of ASCE 7:
   3.1. Torsional or extreme torsional irregularity.
   3.2. Nonparallel systems irregularity.
   3.3. Stiffness-soft story or stiffness-extreme soft story irregularity.
   3.4. Discontinuity in lateral strength-weak story irregularity.

1705.12.1 Structural steel. *Special inspections* for seismic resistance shall be in accordance with Section 1705.12.1.1 or 1705.12.1.2, as applicable.

1705.12.1.1 Seismic force-resisting systems. *Special inspections* of structural steel in the seismic force-resisting systems in buildings and structures assigned to *Seismic Design Category* B, C, D, E or F shall be performed in accordance with the quality assurance requirements of AISC 341.

Exceptions:

1. In buildings and structures assigned to *Seismic Design Category* B or C, *special inspections* are not required for structural steel seismic force-resisting systems where the response modification coefficient, *R*, designated for "Steel systems not specifically detailed for seismic resistance, excluding cantilever column systems" in ASCE 7, Table 12.2-1, has been used for design and detailing.
2. In structures assigned to *Seismic Design Category* D, E, or F, *special inspections* are not required for structural steel seismic force-resisting systems where design and detailing in accordance with AISC 360 is permitted by ASCE 7, Table 15.4-1.

1705.12.1.2 Structural steel elements. *Special inspections* of *structural steel elements* in the seismic force-resisting systems of buildings and structures assigned to *Seismic Design Category* B, C, D, E or F other than those covered in Section 1705.12.1.1, including struts, collectors, chords and foundation elements, shall be performed in accordance with the quality assurance requirements of AISC 341.

Exceptions:

1. In buildings and structures assigned to *Seismic Design Category* B or C, *special inspections* of *structural steel elements* are not required for seismic force-resisting systems with a response modification coefficient, *R*, of 3 or less.
2. In structures assigned to *Seismic Design Category* D, E, or F, *special inspections* of *structural steel elements* are not required for seismic force-resisting systems where design and detailing other than AISC 341 is permitted by ASCE 7, Table 15.4-1. *Special inspection* shall be in accordance with the applicable referenced standard listed in ASCE 7, Table 15.4-1.

[W][S] 1705.12.2 Structural wood. For the seismic force-resisting systems of structures assigned to *Seismic Design Category* C, D, E or F:

1. *Continuous special inspection* shall be required during field gluing operations of elements of the seismic force-resisting system.
2. *Periodic special inspection* shall be required for nailing, bolting, anchoring and other fastening of elements of the seismic force-resisting system, including wood shear walls, wood diaphragms, drag struts, braces, shear panels and hold-downs.

Exceptions:

1. *Special inspections* are not required for wood shear walls, shear panels and diaphragms, including nailing, bolting, anchoring and other fastening to other elements of the seismic force-resisting system other than adhesive-grouted anchor bolts, where the lateral resistance is provided by sheathing of wood structural panels, and the fastener spacing of the sheathing is more than 4 inches (102 mm) on center.
2. *Special inspection* is not required for Group R-3 structures for other than structural insulated panels used as shear walls.
3. *Special inspection* is not required in Group R-1 and R-2 structures three *stories* and less in height for other than structural insulated panels used as shear walls.
4. *Special inspection* is not required for adhesive-grouted anchor bolts in Group R-1 and R-2 buildings if wood shear-wall fastener spacing is 4 inches (102 mm) or more on center (o.c.) and hold down capacities are less than 5,000 pounds (22.2 kN).

1705.12.3 Cold-formed steel light-frame construction. For the seismic force-resisting systems of structures assigned to *Seismic Design Category* C, D, E or F, periodic special inspection shall be required for both:

1. Welding operations of elements of the seismic force-resisting system.
2. Screw attachment, bolting, anchoring and other fastening of elements of the seismic force-resisting system, including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs.

Exception: *Special inspections* are not required for cold-formed steel light-frame shear walls and diaphragms, including screw installation, bolting, anchoring and other fastening to components of the seismic force-resisting system, where either of the following applies:

1. The sheathing is gypsum board or fiberboard.
2. The sheathing is wood structural panel or steel sheets on only one side of the shear wall, shear panel or diaphragm assembly and the fastener spacing of the sheathing is more than 4 inches (102 mm) on center.

1705.12.4 Designated seismic systems. For structures assigned to *Seismic Design Category* C, D, E or F, the special inspector shall examine *designated seismic systems* requiring seismic qualification in accordance with Section 13.2.2 of ASCE 7 and verify that the label, anchorage and mounting conform to the *certificate of compliance*.

1705.12.5 Architectural components. *Periodic special inspection* is required for the erection and fastening of exterior cladding, interior and exterior nonbearing walls and interior and exterior veneer in structures assigned to *Seismic Design Category* D, E or F.

Exception: *Periodic special inspection* is not required for the following:

1. Exterior cladding, interior and exterior nonbearing walls and interior and exterior veneer 30 feet (9144 mm) or less in height above grade or walking surface.
2. Exterior cladding and interior and exterior veneer weighing 5 psf (24.5 N/m^2) or less.
3. Interior nonbearing walls weighing 15 psf (73.5 N/m^2) or less.

1705.12.5.1 Access floors. Periodic *special inspection* is required for the anchorage of access floors in structures assigned to *Seismic Design Category* D, E or F.

[W] 1705.12.6 Plumbing, mechanical and electrical components. *Periodic special inspection* of plumbing, mechanical and electrical components shall be required for the following:

1. Anchorage of electrical equipment for emergency and standby power systems in structures assigned to *Seismic Design Category* C, D, E or F.
2. Anchorage of other electrical equipment in structures assigned to *Seismic Design Category* E or F.
3. Installation and anchorage of piping systems designed to carry hazardous materials and their associated mechanical units in structures assigned to *Seismic Design Category* C, D, E or F.
4. Installation and anchorage of ductwork designed to carry hazardous materials in structures assigned to *Seismic Design Category* C, D, E or F.
5. Installation and anchorage of vibration isolation systems in structures assigned to *Seismic Design Category* C, D, E or F where the *approved construction documents* require a nominal clearance of 1/4 inch (6.4 mm) or less between the equipment support frame and restraint.
6. Installation of mechanical and electrical equipment, including duct work, piping systems and their structural supports, where automatic fire sprinkler systems are installed in *Risk Category IV* structures assigned to Seismic Design Category C, D, E or F to verify one of the following:
   - 6.1. Minimum clearances have been provided as required by Section 13.2.3 ASCE/SEI 7.
   - 6.2. A nominal clearance of not less than 3 inches (76 mm) has been be provided between fire protection sprinkler system drops and sprigs and: structural members not used collectively or independently to support the sprinklers; equipment attached to the building structure; and other systems' piping.

   Where flexible sprinkler hose fittings are used, special inspection of minimum clearances is not required.

1705.12.7 Storage racks. *Periodic special inspection* is required for the anchorage of storage racks that are 8 feet (2438 mm) or greater in height in structures assigned to *Seismic Design Category* D, E or F.

1705.12.8 Seismic isolation systems. *Periodic special inspection* shall be provided for seismic isolation systems in seismically isolated structures assigned to *Seismic Design Category* B, C, D, E or F during the fabrication and installation of isolator units and energy dissipation devices.

4. Bond strength adhesion/cohesion.
5. Condition of finished application.

[BF] 1705.14.2 Structural member surface conditions. The surfaces shall be prepared in accordance with the *approved* fire-resistance design and the written instructions of *approved* manufacturers. The prepared surface of structural members to be sprayed shall be inspected by the special inspector before the application of the sprayed fire-resistant material.

[S][BF] 1705.14.3 Application. The substrate shall have a minimum ambient temperature before and after application as specified in the written instructions of *approved* manufacturers. ((~~The area for application shall be ventilated during and after application as required by the written instructions of *approved* manufacturers.~~))

[BF] 1705.14.4 Thickness. Not more than 10 percent of the thickness measurements of the sprayed fire-resistant materials applied to floor, roof and wall assemblies and structural members shall be less than the thickness required by the *approved* fire-resistance design, and none shall be less than the minimum allowable thickness required by Section 1705.14.4.1.

[BF] 1705.14.4.1 Minimum allowable thickness. For design thicknesses 1 inch (25 mm) or greater, the minimum allowable individual thickness shall be the design thickness minus 1/4 inch (6.4 mm). For design thicknesses less than 1 inch (25 mm), the minimum allowable individual thickness shall be the design thickness minus 25 percent. Thickness shall be determined in accordance with ASTM E605. Samples of the sprayed fire-resistant materials shall be selected in accordance with Sections 1705.14.4.2 and 1705.14.4.3.

[BF] 1705.14.4.2 Floor, roof and wall assemblies. The thickness of the sprayed fire-resistant material applied to floor, roof and wall assemblies shall be determined in accordance with ASTM E605, making not less than four measurements for each 1,000 square feet (93 m^2) of the sprayed area, or portion thereof, in each *story*.

[BF] 1705.14.4.3 Cellular decks. Thickness measurements shall be selected from a square area, 12 inches by 12 inches (305 mm by 305 mm) in size. Not fewer than four measurements shall be made, located symmetrically within the square area.

[BF] 1705.14.4.4 Fluted decks. Thickness measurements shall be selected from a square area, 12 inches by 12 inches (305 mm by 305 mm) in size. Not fewer than four measurements shall be made, located symmetrically within the square area, including one each of the following: valley, crest and sides. The average of the measurements shall be reported.

[BF] 1705.14.4.5 Structural members. The thickness of the sprayed fire-resistant material applied to structural members shall be determined in accordance with ASTM E605. Thickness testing shall be performed on not less than 25 percent of the structural members on each floor.

[BF] 1705.14.4.6 Beams and girders. At beams and girders thickness measurements shall be made at nine locations around the beam or girder at each end of a 12-inch (305 mm) length.

[BF] 1705.14.4.7 Joists and trusses. At joists and trusses, thickness measurements shall be made at seven locations around the joist or truss at each end of a 12-inch (305 mm) length.

[BF] 1705.14.4.8 Wide-flanged columns. At wide-flanged columns, thickness measurements shall be made at 12 locations around the column at each end of a 12-inch (305 mm) length.

[BF] 1705.14.4.9 Hollow structural section and pipe columns. At hollow structural section and pipe columns, thickness measurements shall be made at not fewer than four locations around the column at each end of a 12-inch (305 mm) length.

[BF] 1705.14.5 Density. The density of the sprayed fire-resistant material shall be not less than the density specified in the *approved* fire-resistance design. Density of the sprayed fire-resistant material shall be determined in accordance with ASTM E605. The test samples for determining the density of the sprayed fire-resistant materials shall be selected as follows:

1. From each floor, roof and wall assembly at the rate of not less than one sample for every 2,500 square feet (232 m^2) or portion thereof of the sprayed area in each *story*.
2. From beams, girders, trusses and columns at the rate of not less than one sample for each type of structural member for each 2,500 square feet (232 m^2) of floor area or portion thereof in each *story*.

[BF] 1705.14.6 Bond strength. The cohesive/adhesive bond strength of the cured sprayed fire-resistant material applied to floor, roof and wall assemblies and structural members shall be not less than 150 pounds per square foot (psf) (7.18 kN/m^2). The cohesive/adhesive bond strength shall be determined in accordance with the field test specified in ASTM E736 by testing in-place samples of the sprayed fire-resistant material selected in accordance with Sections 1705.14.6.1 through 1705.14.6.3.

[BF] 1705.14.6.1 Floor, roof and wall assemblies. The test samples for determining the cohesive/adhesive bond strength of the sprayed fire-resistant materials shall be selected from each floor, roof and wall assembly at the rate of not less than one sample for every 2,500 square feet (232 m^2) of the sprayed area, or portion thereof, in each *story*.

[BF] 1705.14.6.2 Structural members. The test samples for determining the cohesive/adhesive bond strength of the sprayed fire-resistant materials shall be selected from beams, girders, trusses, columns and other structural members at the

rate of not less than one sample for each type of structural member for each 2,500 square feet (232 m^2) of floor area or portion thereof in each *story*.

[BF] 1705.14.6.3 Primer, paint and encapsulant bond tests. Bond tests to qualify a primer, paint or encapsulant shall be conducted where the sprayed fire-resistant material is applied to a primed, painted or encapsulated surface for which acceptable bond-strength performance between these coatings and the fire-resistant material has not been determined. A bonding agent *approved* by the SFRM manufacturer shall be applied to a primed, painted or encapsulated surface where the bond strengths are found to be less than required values.

[BF] 1705.15 Mastic and intumescent fire-resistant coatings. *Special inspections* and tests for mastic and intumescent fire-resistant coatings applied to structural elements and decks shall be performed in accordance with AWCI 12-B. *Special inspections* and tests shall be based on the fire-resistance design as designated in the *approved construction documents*.

[S] ((~~1705.16 Exterior insulation and finish systems (EIFS).~~ ~~*Special inspections* shall be required for all EIFS applications.~~

~~**Exceptions:**~~

1. ~~*Special inspections* shall not be required for EIFS applications installed over a *water-resistive barrier* with a means of draining moisture to the exterior.~~
2. ~~*Special inspections* shall not be required for EIFS applications installed over masonry or concrete walls.~~

~~**1705.16.1 Water-resistive barrier coating.** A *water-resistive barrier* coating complying with ASTM E2570 requires *special inspection* of the *water-resistive barrier* coating where installed over a sheathing substrate.~~))

[W] 1705.16 Sealing of mass timber. Periodic special inspections of sealants or adhesives shall be conducted where sealant or adhesive required by Section 703.9 is applied to mass timber building elements as designated in the approved construction documents.

[BF] 1705.17 Fire-resistant penetrations and joints. In *high-rise buildings* or in buildings assigned to *Risk Category* III or IV, *special inspections* for *through-penetrations*, membrane penetration firestops, *fire-resistant joint systems* and perimeter fire barrier systems that are tested and *listed* in accordance with Sections 714.4.1.2, 714.5.1.2, 715.3 and 715.4 shall be in accordance with Section 1705.17.1 or 1705.17.2.

[BF] 1705.17.1 Penetration firestops. Inspections of penetration firestop systems that are tested and *listed* in accordance with Sections 714.4.1.2 and 714.5.1.2 shall be conducted by an *approved agency* in accordance with ASTM E2174.

[BF] 1705.17.2 Fire-resistant joint systems. Inspection of fire-resistant joint systems that are tested and *listed* in accordance with Sections 715.3 and 715.4 shall be conducted by an *approved agency* in accordance with ASTM E2393.

[S][F] 1705.18 Testing for smoke control. Smoke control systems shall be inspected and tested ((~~by a special inspector~~)) according to standards specified by the *building official*.

((~~[F] 1705.18.1 Testing scope.~~ ~~The test scope shall be as follows:~~

1. ~~During erection of ductwork and prior to concealment for the purposes of leakage testing and recording of device location.~~
2. ~~Prior to occupancy and after sufficient completion for the purposes of pressure difference testing, flow measurements and detection and control verification.~~

~~**[F] 1705.18.2 Qualifications.** *Approved agencies* for smoke control testing shall have expertise in fire protection engineering, mechanical engineering and certification as air balancers.~~))

SECTION 1706
DESIGN STRENGTHS OF MATERIALS

1706.1 Conformance to standards. The design strengths and permissible stresses of any structural material that are identified by a manufacturer's designation as to manufacture and grade by mill tests, or the strength and stress grade is otherwise confirmed to the satisfaction of the *building official*, shall conform to the specifications and methods of design of accepted engineering practice or the *approved* rules in the absence of applicable standards.

1706.2 New materials. For materials that are not specifically provided for in this code, the design strengths and permissible stresses shall be established by tests as provided for in Section 1707.

SECTION 1707
ALTERNATIVE TEST PROCEDURE

[S] 1707.1 General. In the absence of *approved* rules or other *approved* standards, the *building official* shall make, or cause to be made, the necessary tests and investigations; or the *building official* shall accept duly authenticated reports from *approved agencies* in respect to the quality and manner of use of new materials or assemblies as provided for in Section ((~~104.11~~)) 104.4

or 104.5. The cost of all tests and other investigations required under the provisions of this code shall be borne by the owner or the owner's authorized agent.

SECTION 1708
IN-SITU LOAD TESTS

1708.1 General. Whenever there is a reasonable doubt as to the stability or load-bearing capacity of a completed building, structure or portion thereof for the expected loads, an engineering assessment shall be required. The engineering assessment shall involve either a structural analysis or an in-situ load test, or both. The structural analysis shall be based on actual material properties and other as-built conditions that affect stability or load-bearing capacity, and shall be conducted in accordance with the applicable design standard. The in-situ load tests shall be conducted in accordance with Section 1708.2. If the building, structure or portion thereof is found to have inadequate stability or load-bearing capacity for the expected loads, modifications to ensure structural adequacy or the removal of the inadequate construction shall be required.

1708.2 In-situ load tests. In-situ load tests shall be conducted in accordance with Section 1708.2.1 or 1708.2.2 and shall be supervised by a *registered design professional*. The test shall simulate the applicable loading conditions specified in Chapter 16 as necessary to address the concerns regarding structural stability of the building, structure or portion thereof.

1708.2.1 Load test procedure specified. Where a referenced material standard contains an applicable load test procedure and acceptance criteria, the test procedure and acceptance criteria in the standard shall apply. In the absence of specific load factors or acceptance criteria, the load factors and acceptance criteria in Section 1708.2.2 shall apply.

1708.2.2 Load test procedure not specified. In the absence of applicable load test procedures contained within a material standard referenced by this code or acceptance criteria for a specific material or method of construction, such *existing structure* shall be subjected to an approved test procedure developed by a *registered design professional* that simulates applicable loading and deformation conditions. For components that are not a part of the seismic force-resisting system, at a minimum the test load shall be equal to the specified factored design loads. For materials such as wood that have strengths that are dependent on load duration, the test load shall be adjusted to account for the difference in load duration of the test compared to the expected duration of the design loads being considered. For statically loaded components, the test load shall be left in place for a period of 24 hours. For components that carry dynamic loads (for example, machine supports or fall arrest anchors), the load shall be left in place for a period consistent with the component's actual function. The structure shall be considered to have successfully met the test requirements where the following criteria are satisfied:

1. Under the design load, the deflection shall not exceed the limitations specified in Section 1604.3.
2. Within 24 hours after removal of the test load, the structure shall have recovered not less than 75 percent of the maximum deflection.
3. During and immediately after the test, the structure shall not show evidence of failure.

SECTION 1709
PRECONSTRUCTION LOAD TESTS

1709.1 General. Where proposed construction is not capable of being designed by *approved* engineering analysis, or where proposed construction design method does not comply with the applicable material design standard, the system of construction or the structural unit and the connections shall be subjected to the tests prescribed in Section 1709. The *building official* shall accept certified reports of such tests conducted by an *approved* testing agency, provided that such tests meet the requirements of this code and *approved* procedures.

1709.2 Load test procedures specified. Where specific load test procedures, load factors and acceptance criteria are included in the applicable referenced standards, such test procedures, load factors and acceptance criteria shall apply. In the absence of specific test procedures, load factors or acceptance criteria, the corresponding provisions in Section 1709.3 shall apply.

1709.3 Load test procedures not specified. Where load test procedures are not specified in the applicable referenced standards, the load-bearing and deformation capacity of structural components and assemblies shall be determined on the basis of a test procedure developed by a *registered design professional* that simulates applicable loading and deformation conditions. For components and assemblies that are not a part of the seismic force-resisting system, the test shall be as specified in Section 1709.3.1. Load tests shall simulate the applicable loading conditions specified in Chapter 16.

1709.3.1 Test procedure. The test assembly shall be subjected to an increasing superimposed load equal to not less than two times the superimposed design load. The test load shall be left in place for a period of 24 hours. The tested assembly shall be considered to have successfully met the test requirements if the assembly recovers not less than 75 percent of the maximum deflection within 24 hours after the removal of the test load. The test assembly shall then be reloaded and subjected to an increasing superimposed load until either structural failure occurs or the superimposed load is equal to two and one-half times the load at which the deflection limitations specified in Section 1709.3.2 were reached, or the load is equal to two and one-half times the superimposed design load. In the case of structural components and assemblies for which deflection limitations

are not specified in Section 1709.3.2, the test specimen shall be subjected to an increasing superimposed load until structural failure occurs or the load is equal to two and one-half times the desired superimposed design load. The allowable superimposed design load shall be taken as the lesser of:

1. The load at the deflection limitation given in Section 1709.3.2.
2. The failure load divided by 2.5.
3. The maximum load applied divided by 2.5.

1709.3.2 Deflection. The deflection of structural members under the design load shall not exceed the limitations in Section 1604.3.

1709.4 Wall and partition assemblies. *Load-bearing wall* and partition assemblies shall sustain the test load both with and without window framing. The test load shall include all design load components. Wall and partition assemblies shall be tested both with and without door and window framing.

[W] 1709.5 Exterior window and door assemblies. The design pressure rating of exterior windows and doors in buildings shall be determined in accordance with Section 1709.5.1 or 1709.5.2. For exterior windows and doors tested in accordance with Sections 1709.5.1 or 1709.5.2, required design wind pressures determined from ASCE 7 shall be permitted to be converted to allowable stress design by multiplying by 0.6.

Exceptions:

1. Structural wind load design pressures for window units smaller than the size tested in accordance with Section 1709.5.1 or 1709.5.2 shall be permitted to be higher than the design value of the tested unit provided such higher pressures are determined by accepted engineering analysis. Components of the small unit shall be the same as the tested unit. Where such calculated design pressures are used, they shall be validated by an additional test of the window unit having the highest allowable design pressure.
2. Custom exterior windows and doors manufactured by *small business* are exempt from all testing requirements in Section 1709 if they meet the applicable provisions of Chapter 24.

1709.5.1 Exterior windows and doors. Exterior windows and sliding doors shall be tested and *labeled* as conforming to AAMA/WDMA/CSA101/I.S.2/A440. The *label* shall state the name of the manufacturer, the *approved* labeling agency and the product designation as specified in AAMA/WDMA/CSA101/I.S.2/A440. Exterior side-hinged doors shall be tested and *labeled* as conforming to AAMA/WDMA/CSA101/I.S.2/A440 or comply with Section 1709.5.2. Products tested and *labeled* as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 shall not be subject to the requirements of Sections 2403.2 and 2403.3.

1709.5.2 Exterior windows and door assemblies not provided for in Section 1709.5.1. Exterior window and door assemblies shall be tested in accordance with ASTM E330. Structural performance of garage doors and rolling doors shall be determined in accordance with either ASTM E330 or ANSI/DASMA 108, and shall meet the acceptance criteria of ANSI/DASMA 108. Exterior window and door assemblies containing glass shall comply with Section 2403. The design pressure for testing shall be calculated in accordance with Chapter 16. Each assembly shall be tested for 10 seconds at a load equal to 1.5 times the design pressure.

1709.6 Skylights and sloped glazing. Skylights and sloped glazing shall comply with the requirements of Chapter 24.

1709.7 Test specimens. Test specimens and construction shall be representative of the materials, workmanship and details normally used in practice. The properties of the materials used to construct the test assembly shall be determined on the basis of tests on samples taken from the load assembly or on representative samples of the materials used to construct the load test assembly. Required tests shall be conducted or witnessed by an *approved agency*.

CHAPTER 18

SOILS AND FOUNDATIONS

User notes:

About this chapter: *Chapter 18 provides criteria for geotechnical and structural considerations in the selection, design and installation of foundation systems to support the loads imposed by the structure above. This chapter includes requirements for soils investigation and site preparation for receiving a foundation, including the load-bearing values for soils and protection for the foundation from frost and water intrusion. Section 1808 addresses the basic requirements for all foundation types while subsequent sections address foundation requirements that are specific to shallow foundations and deep foundations.*

Code development reminder: *Code change proposals to this chapter will be considered by the IBC—Structural Code Development Committee during the 2019 (Group B) Code Development Cycle. See explanation on page iv.*

SECTION 1801
GENERAL

1801.1 Scope. The provisions of this chapter shall apply to building and foundation systems.

SECTION 1802
DESIGN BASIS

[S] 1802.1 General. Allowable bearing pressures, allowable stresses and design formulas provided in this chapter shall be used with the *allowable stress design* load combinations specified in Section 1605.3. The quality and design of materials used structurally in excavations and foundations shall comply with the requirements specified in Chapters 16, 19, 21, 22 and 23. Excavations, ((~~and~~)) fills and *land-disturbing activity* shall comply with Chapter 33, the Seattle Stormwater Code (*Seattle Municipal Code* Chapter 22.800), the Seattle Grading Code (*Seattle Municipal Code* Chapter 22.170), and the Regulations for Environmentally Critical Areas (*Seattle Municipal Code* Chapter 25.09) and any rules adopted and conditions imposed under any of them.

SECTION 1803
GEOTECHNICAL INVESTIGATIONS

1803.1 General. Geotechnical investigations shall be conducted in accordance with Section 1803.2 and reported in accordance with Section 1803.6. Where ((~~required by the *building official* or where~~)) geotechnical investigations involve in-situ testing, laboratory testing or engineering calculations, such investigations shall be conducted by a *registered design professional*.

1803.2 Investigations required. Geotechnical investigations shall be conducted in accordance with Sections 1803.3 through 1803.5.

Exception: The *building official* shall be permitted to waive the requirement for a geotechnical investigation where satisfactory data from adjacent areas is available that demonstrates an investigation is not necessary for any of the conditions in Sections 1803.5.1 through 1803.5.6 and Sections 1803.5.10 and 1803.5.11.

1803.3 Basis of investigation. Soil classification shall be based on observation and any necessary tests of the materials disclosed by borings, test pits or other subsurface exploration made in appropriate locations. Additional studies shall be made as necessary to evaluate slope stability, soil strength, position and adequacy of load-bearing soils, the effect of moisture variation on soil-bearing capacity, compressibility, liquefaction and expansiveness.

1803.3.1 Scope of investigation. The scope of the geotechnical investigation including the number and types of borings or soundings, the equipment used to drill or sample, the in-situ testing equipment and the laboratory testing program shall be determined by a *registered design professional*.

1803.4 Qualified representative. The investigation procedure and apparatus shall be in accordance with generally accepted engineering practice. The *registered design professional* shall have a fully qualified representative on site during all boring or sampling operations.

1803.5 Investigated conditions. Geotechnical investigations shall be conducted as indicated in Sections 1803.5.1 through 1803.5.12.

1803.5.1 Classification. Soil materials shall be classified in accordance with ASTM D2487.

1803.5.2 Questionable soil. Where the classification, strength or compressibility of the soil is in doubt or where a load-bearing value superior to that specified in this code is claimed, the *building official* shall be permitted to require that a geotechnical investigation be conducted.

1803.5.3 Expansive soil. In areas likely to have expansive soil, the *building official* shall require soil tests to determine where such soils do exist.

Soils meeting all four of the following provisions shall be considered to be expansive, except that tests to show compliance with Items 1, 2 and 3 shall not be required if the test prescribed in Item 4 is conducted:

1. Plasticity index (PI) of 15 or greater, determined in accordance with ASTM D4318.
2. More than 10 percent of the soil particles pass a No. 200 sieve (75 μm), determined in accordance with ASTM D422.
3. More than 10 percent of the soil particles are less than 5 micrometers in size, determined in accordance with ASTM D422.
4. Expansion index greater than 20, determined in accordance with ASTM D4829.

[S] 1803.5.4 Ground water table. A subsurface soil investigation shall be performed to determine whether the existing static ground water table is above or within 5 feet (1524 mm) below the elevation of the lowest floor level where such floor is located below the finished ground level adjacent to the foundation.

Exception: A subsurface soil investigation to determine the location of the ground water table shall not be required where waterproofing is provided in accordance with Section 1805.

1803.5.5 Deep foundations. Where deep foundations will be used, a geotechnical investigation shall be conducted and shall include all of the following, unless sufficient data on which to base the design and installation is otherwise available:

1. Recommended deep foundation types and installed capacities.
2. Recommended center-to-center spacing of deep foundation elements.
3. Driving criteria.
4. Installation procedures.
5. Field inspection and reporting procedures (to include procedures for verification of the installed bearing capacity where required).
6. Load test requirements.
7. Suitability of deep foundation materials for the intended environment.
8. Designation of bearing stratum or strata.
9. Reductions for group action, where necessary.

[S] 1803.5.6 Rock strata. Where subsurface explorations at the project site indicate variations in the structure of rock on which foundations are to be constructed, the *building official* is permitted to require a sufficient number of borings ((~~shall~~)) to be drilled to sufficient depths to assess the competency of the rock and its load-bearing capacity.

1803.5.7 Excavation near foundations. Where excavation will reduce support from any foundation, a *registered design professional* shall prepare an assessment of the structure as determined from examination of the structure, the review of available design documents and, if necessary, excavation of test pits. The *registered design professional* shall determine the requirements for underpinning and protection and prepare site-specific plans, details and sequence of work for submission. Such support shall be provided by underpinning, sheeting and bracing, or by other means acceptable to the *building official*.

1803.5.8 Compacted fill material. Where shallow foundations will bear on compacted fill material more than 12 inches (305 mm) in depth, a geotechnical investigation shall be conducted and shall include all of the following:

1. Specifications for the preparation of the site prior to placement of compacted fill material.
2. Specifications for material to be used as compacted fill.
3. Test methods to be used to determine the maximum dry density and optimum moisture content of the material to be used as compacted fill.
4. Maximum allowable thickness of each lift of compacted fill material.
5. Field test method for determining the in-place dry density of the compacted fill.
6. Minimum acceptable in-place dry density expressed as a percentage of the maximum dry density determined in accordance with Item 3.
7. Number and frequency of field tests required to determine compliance with Item 6.

1803.5.9 Controlled low-strength material (CLSM). Where shallow foundations will bear on controlled low-strength material (CLSM), a geotechnical investigation shall be conducted and shall include all of the following:

1. Specifications for the preparation of the site prior to placement of the CLSM.
2. Specifications for the CLSM.
3. Laboratory or field test method(s) to be used to determine the compressive strength or bearing capacity of the CLSM.
4. Test methods for determining the acceptance of the CLSM in the field.
5. Number and frequency of field tests required to determine compliance with Item 4.

[S] ((~~1803.5.10 Alternate setback and clearance.~~ ~~Where setbacks or clearances other than those required in Section 1808.7 are desired, the *building official* shall be permitted to require a geotechnical investigation by a *registered design professional* to demonstrate that the intent of Section 1808.7 would be satisfied. Such an investigation shall include consideration of material, height of slope, slope gradient, load intensity and erosion characteristics of slope material.~~))

[S] 1803.5.11 Seismic Design Categories C through F. For structures assigned to *Seismic Design Category* C, D, E or F, and where the structure is located in an area known to be a geologic hazard area as defined in the Regulations for Environmentally Critical Areas (*Seattle Municipal Code* Chapter 25.09), a geotechnical investigation shall be conducted, and shall include an evaluation of all of the following potential geologic and seismic hazards:

1. Slope instability.
2. Liquefaction.
3. Total and differential settlement.
4. Surface displacement due to faulting or seismically induced lateral spreading or lateral flow.

Exception: The *building official* is permitted to waive this evaluation upon receipt of the written opinion of a geotechnical engineer that the building's foundation design adequately addresses liquefaction.

[S] 1803.5.11.1 Slope instability. The potential for slope instability shall be evaluated for the design earthquake ground motion specified in Chapter 16 and Section 11.4.5 of ASCE 7. Peak ground acceleration is also permitted to be determined based on a site-specific study taking into account soil amplification effects. If a pseudostatic stability analysis is performed, the seismic coefficient shall correspond to some fraction of the anticipated peak ground acceleration.

[S] 1803.5.12 Seismic Design Categories D through F. For structures assigned to *Seismic Design Category* D, E or F, and where the structure is located in an area known to be a geologic hazard area as defined in the Regulations for Environmentally Critical Areas (*Seattle Municipal Code* Chapter 25.09), or where basement or retaining walls in geologic hazard areas exceed 12 feet (3658 mm) in height, the geotechnical investigation required by Section 1803.5.11 shall include all of the following as applicable:

1. The determination of dynamic seismic lateral earth pressures on foundation walls and retaining walls supporting more than 6 feet (1.83 m) of backfill height due to design earthquake ground motions.
2. The potential for liquefaction and soil strength loss evaluated for site peak ground acceleration, earthquake magnitude and source characteristics consistent with the maximum considered earthquake ground motions. Peak ground acceleration shall be determined based on one of the following:
   - 2.1. A site-specific study in accordance with Chapter 21 of ASCE 7.
   - 2.2. In accordance with Section 11.8.3 of ASCE 7.
3. An assessment of potential consequences of liquefaction and soil strength loss including, but not limited to, the following:
   - 3.1. Estimation of total and differential settlement.
   - 3.2. Lateral soil movement.
   - 3.3. Lateral soil loads on foundations.
   - 3.4. Reduction in foundation soil-bearing capacity and lateral soil reaction.
   - 3.5. Soil downdrag and reduction in axial and lateral soil reaction for pile foundations.
   - 3.6. Increases in soil lateral pressures on retaining walls.
   - 3.7. Flotation of buried structures.
4. Discussion of mitigation measures such as, but not limited to, the following:
   - 4.1. Selection of appropriate foundation type and depths.
   - 4.2. Selection of appropriate structural systems to accommodate anticipated displacements and forces.
   - 4.3. Ground stabilization.
   - 4.4. Any combination of these measures and how they shall be considered in the design of the structure.

[S] 1803.6 Reporting. Where geotechnical investigations are required, a written report of the investigations shall be submitted to the *building official* by the permit applicant at the time of permit application. This geotechnical report shall include, but need not be limited to, the following information:

1. A plot showing the location of the soil investigations.
2. A complete record of the soil boring and penetration test logs and soil samples.
3. A record of the soil profile.
4. Elevation of the water table, if encountered.
5. Recommendations for foundation type and design criteria, including but not limited to: bearing capacity of natural or compacted soil; provisions to mitigate the effects of expansive soils; mitigation of the effects of liquefaction, differential settlement and varying soil strength; mitigation of the effects of slope instability; and the effects of adjacent loads.
6. Expected total and differential settlement.
7. Deep foundation information in accordance with Section 1803.5.5.
8. Special design and construction provisions for foundations of structures founded on expansive soils, as necessary.
9. Compacted fill material properties and testing in accordance with Section 1803.5.8.
10. Controlled low-strength material properties and testing in accordance with Section 1803.5.9.

SECTION 1804
EXCAVATION, GRADING AND FILL

1804.1 Excavation near foundations. Excavation for any purpose shall not reduce vertical or lateral support for any foundation or adjacent foundation without first underpinning or protecting the foundation against detrimental lateral or vertical movement, or both.

1804.2 Underpinning. Where underpinning is chosen to provide the protection or support of adjacent structures, the underpinning system shall be designed and installed in accordance with provisions of this chapter and Chapter 33.

1804.2.1 Underpinning sequencing. Underpinning shall be installed in a sequential manner that protects the neighboring structure and the working construction site. The sequence of installation shall be identified in the *approved construction documents.*

1804.3 Placement of backfill. The excavation outside the foundation shall be backfilled with soil that is free of organic material, construction debris, cobbles and boulders or with a controlled low-strength material (CLSM). The backfill shall be placed in lifts and compacted in a manner that does not damage the foundation or the waterproofing or dampproofing material.

Exception: CLSM need not be compacted.

1804.4 Site grading. The ground immediately adjacent to the foundation shall be sloped away from the building at a slope of not less than one unit vertical in 20 units horizontal (5-percent slope) for a minimum distance of 10 feet (3048 mm) measured perpendicular to the face of the wall. If physical obstructions or lot lines prohibit 10 feet (3048 mm) of horizontal distance, a 5-percent slope shall be provided to an *approved* alternative method of diverting water away from the foundation. Swales used for this purpose shall be sloped not less than 2 percent where located within 10 feet (3048 mm) of the building foundation. Impervious surfaces within 10 feet (3048 mm) of the building foundation shall be sloped not less than 2 percent away from the building.

Exceptions:

1. Where climatic or soil conditions warrant, the slope of the ground away from the building foundation shall be permitted to be reduced to not less than one unit vertical in 48 units horizontal (2-percent slope).
2. Impervious surfaces shall be permitted to be sloped less than 2 percent where the surface is a door landing or ramp that is required to comply with Section 1010.1.5, 1012.3 or 1012.6.1.

The procedure used to establish the final ground level adjacent to the foundation shall account for additional settlement of the backfill.

1804.5 Grading and fill in flood hazard areas. In *flood hazard areas* established in Section 1612.3, grading, fill, or both, shall not be *approved*:

1. Unless such fill is placed, compacted and sloped to minimize shifting, slumping and erosion during the rise and fall of floodwater and, as applicable, wave action.
2. In floodways, unless it has been demonstrated through hydrologic and hydraulic analyses performed by a *registered design professional* in accordance with standard engineering practice that the proposed grading or fill, or both, will not result in any increase in flood levels during the occurrence of the *design flood.*

1805.2.2.1 Surface preparation of walls. Prior to application of dampproofing materials on concrete walls, holes and recesses resulting from the removal of form ties shall be sealed with a bituminous material or other *approved* methods or materials. Unit masonry walls shall be parged on the exterior surface below ground level with not less than 3/8 inch (9.5 mm) of Portland cement mortar. The parging shall be coved at the footing.

Exception: Parging of unit masonry walls is not required where a material is *approved* for direct application to the masonry.

1805.3 Waterproofing. Where the ground water investigation required by Section 1803.5.4 indicates that a hydrostatic pressure condition exists, and the design does not include a ground water control system as described in Section 1805.1.3, walls and floors shall be waterproofed in accordance with this section.

1805.3.1 Floors. Floors required to be waterproofed shall be of concrete and designed and constructed to withstand the hydrostatic pressures to which the floors will be subjected.

Waterproofing shall be accomplished by placing a membrane of rubberized asphalt, butyl rubber, fully adhered/fully bonded HDPE or polyolefin composite membrane or not less than 6-mil [0.006 inch (0.152 mm)] polyvinyl chloride with joints lapped not less than 6 inches (152 mm) or other *approved* materials under the slab. Joints in the membrane shall be lapped and sealed in accordance with the manufacturer's installation instructions.

1805.3.2 Walls. Walls required to be waterproofed shall be of concrete or masonry and shall be designed and constructed to withstand the hydrostatic pressures and other lateral loads to which the walls will be subjected.

Waterproofing shall be applied from the bottom of the wall to not less than 12 inches (305 mm) above the maximum elevation of the ground water table. The remainder of the wall shall be dampproofed in accordance with Section 1805.2.2. Waterproofing shall consist of two-ply hot-mopped felts, not less than 6-mil (0.006 inch; 0.152 mm) polyvinyl chloride, 40-mil (0.040 inch; 1.02 mm) polymer-modified asphalt, 6-mil (0.006 inch; 0.152 mm) polyethylene or other *approved* methods or materials capable of bridging nonstructural cracks. Joints in the membrane shall be lapped and sealed in accordance with the manufacturer's installation instructions.

1805.3.2.1 Surface preparation of walls. Prior to the application of waterproofing materials on concrete or masonry walls, the walls shall be prepared in accordance with Section 1805.2.2.1.

1805.3.3 Joints and penetrations. Joints in walls and floors, joints between the wall and floor and penetrations of the wall and floor shall be made watertight utilizing *approved* methods and materials.

1805.4 Subsoil drainage system. Where a hydrostatic pressure condition does not exist, dampproofing shall be provided and a base shall be installed under the floor and a drain installed around the foundation perimeter. A subsoil drainage system designed and constructed in accordance with Section 1805.1.3 shall be deemed adequate for lowering the ground-water table.

1805.4.1 Floor base course. Floors of basements, except as provided for in Section 1805.1.1, shall be placed over a floor base course not less than 4 inches (102 mm) in thickness that consists of gravel or crushed stone containing not more than 10 percent of material that passes through a No. 4 (4.75 mm) sieve.

Exception: Where a site is located in well-drained gravel or sand/gravel mixture soils, a floor base course is not required.

1805.4.2 Foundation drain. A drain shall be placed around the perimeter of a foundation that consists of gravel or crushed stone containing not more than 10-percent material that passes through a No. 4 (4.75 mm) sieve. The drain shall extend not less than 12 inches (305 mm) beyond the outside edge of the footing. The thickness shall be such that the bottom of the drain is not higher than the bottom of the base under the floor, and that the top of the drain is not less than 6 inches (152 mm) above the top of the footing. The top of the drain shall be covered with an *approved* filter membrane material. Where a drain tile or perforated pipe is used, the invert of the pipe or tile shall not be higher than the floor elevation. The top of joints or the top of perforations shall be protected with an *approved* filter membrane material. The pipe or tile shall be placed on not less than 2 inches (51 mm) of gravel or crushed stone complying with Section 1805.4.1, and shall be covered with not less than 6 inches (152 mm) of the same material.

[S] 1805.4.3 Drainage discharge. The floor base and foundation perimeter drain shall discharge by gravity or mechanical means into an *approved* drainage system that complies with the *International Plumbing Code*.

((~~Exception:~~ ~~Where a site is located in well-drained gravel or sand/gravel mixture soils, a dedicated drainage system is not required.~~))

SECTION 1806
PRESUMPTIVE LOAD-BEARING VALUES OF SOILS

1806.1 Load combinations. The presumptive load-bearing values provided in Table 1806.2 shall be used with the *allowable stress design* load combinations specified in Section 1605.3. The values of vertical foundation pressure and lateral bearing pressure given in Table 1806.2 shall be permitted to be increased by one-third where used with the alternative basic load combinations of Section 1605.3.2 that include wind or earthquake loads.

TABLE 1807.1.6.3(4)
12-INCH MASONRY FOUNDATION WALLS WITH REINFORCEMENT WHERE d ≥ 8.75 INCHES[a, b, c]

MAXIMUM WALL HEIGHT (feet-inches)	MAXIMUM UNBALANCED BACKFILL HEIGHT[d] (feet-inches)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)		
		Design lateral soil load[a] (psf per foot of depth)		
		30[e]	45[e]	60
7-4	4 (or less)	#4 at 72	#4 at 72	#4 at 72
	5-0	#4 at 72	#4 at 72	#4 at 72
	6-0	#4 at 72	#4 at 72	#5 at 72
	7-4	#4 at 72	#5 at 72	#6 at 72
8-0	4 (or less)	#4 at 72	#4 at 72	#4 at 72
	5-0	#4 at 72	#4 at 72	#4 at 72
	6-0	#4 at 72	#4 at 72	#5 at 72
	7-0	#4 at 72	#5 at 72	#6 at 72
	8-0	#5 at 72	#6 at 72	#8 at 72
8-8	4 (or less)	#4 at 72	#4 at 72	#4 at 72
	5-0	#4 at 72	#4 at 72	#4 at 72
	6-0	#4 at 72	#4 at 72	#5 at 72
	7-0	#4 at 72	#5 at 72	#6 at 72
	8-8[e]	#5 at 72	#7 at 72	#8 at 72
9-4	4 (or less)	#4 at 72	#4 at 72	#4 at 72
	5-0	#4 at 72	#4 at 72	#4 at 72
	6-0	#4 at 72	#5 at 72	#5 at 72
	7-0	#4 at 72	#5 at 72	#6 at 72
	8-0	#5 at 72	#6 at 72	#7 at 72
	9-4[e]	#6 at 72	#7 at 72	#8 at 72
10-0	4 (or less)	#4 at 72	#4 at 72	#4 at 72
	5-0	#4 at 72	#4 at 72	#4 at 72
	6-0	#4 at 72	#5 at 72	#5 at 72
	7-0	#4 at 72	#6 at 72	#6 at 72
	8-0	#5 at 72	#6 at 72	#7 at 72
	9-0[e]	#6 at 72	#7 at 72	#8 at 72
	10-0[e]	#7 at 72	#8 at 72	#9 at 72

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/m.

a. For design lateral soil loads, see Section 1610.

b. Provisions for this table are based on design and construction requirements specified in Section 1807.1.6.3.

c. For alternative reinforcement, see Section 1807.1.6.3.1.

d. For height of unbalanced backfill, see Section 1807.1.2.

e Where unbalanced backfill height exceeds 8 feet and design lateral soil loads from Table 1610.1 are used, the requirements for 30 and 45 psf per foot of depth are not applicable. See Section 1610.

1807.1.6.3.1 Alternative foundation wall reinforcement. In lieu of the reinforcement provisions for masonry foundation walls in Table 1807.1.6.3(2), 1807.1.6.3(3) or 1807.1.6.3(4), alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per linear foot (mm) of wall shall be permitted to be used, provided that the spacing of reinforcement does not exceed 72 inches (1829 mm) and reinforcing bar sizes do not exceed No. 11.

1807.1.6.3.2 Seismic requirements. Based on the *seismic design category* assigned to the structure in accordance with Section 1613, masonry foundation walls designed using Tables 1807.1.6.3(1) through 1807.1.6.3(4) shall be subject to the following limitations:

1. *Seismic Design Categories* A and B. No additional seismic requirements.
2. *Seismic Design Category* C. A design using Tables 1807.1.6.3(1) through 1807.1.6.3(4) is subject to the seismic requirements of Section 7.4.3 of TMS 402.
3. *Seismic Design Category* D. A design using Tables 1807.1.6.3(2) through 1807.1.6.3(4) is subject to the seismic requirements of Section 7.4.4 of TMS 402.
4. *Seismic Design Categories* E and F. A design using Tables 1807.1.6.3(2) through 1807.1.6.3(4) is subject to the seismic requirements of Section 7.4.5 of TMS 402.

1807.2 Retaining walls. Retaining walls shall be designed in accordance with Sections 1807.2.1 through 1807.2.3.

1807.2.1 General. Retaining walls shall be designed to ensure stability against overturning, sliding, excessive foundation pressure and water uplift.

[W] 1807.2.2 Design lateral soil loads. Retaining walls shall be designed for the lateral soil loads set forth in Section 1610. For structures assigned to Seismic Design Category D, E, or F, the design of retaining walls supporting more than 6 feet

(1829 mm) of backfill height measured to the bottom of the footing shall incorporate the additional seismic lateral earth pressure in accordance with the geotechnical investigation where required in Section 1803.2.

1807.2.3 Safety factor. Retaining walls shall be designed to resist the lateral action of soil to produce sliding and overturning with a minimum safety factor of 1.5 in each case. The load combinations of Section 1605 shall not apply to this requirement. Instead, design shall be based on 0.7 times nominal earthquake loads, 1.0 times other *nominal loads*, and investigation with one or more of the variable loads set to zero. The safety factor against lateral sliding shall be taken as the available soil resistance at the base of the retaining wall foundation divided by the net lateral force applied to the retaining wall.

Exception: Where earthquake loads are included, the minimum safety factor for retaining wall sliding and overturning shall be 1.1.

1807.3 Embedded posts and poles. Designs to resist both axial and lateral loads employing posts or poles as columns embedded in earth or in concrete footings in earth shall be in accordance with Sections 1807.3.1 through 1807.3.3.

1807.3.1 Limitations. The design procedures outlined in this section are subject to the following limitations:

1. The frictional resistance for structural walls and slabs on silts and clays shall be limited to one-half of the normal force imposed on the soil by the weight of the footing or slab.
2. Posts embedded in earth shall not be used to provide lateral support for structural or nonstructural materials such as plaster, masonry or concrete unless bracing is provided that develops the limited deflection required.

Wood poles shall be treated in accordance with AWPA U1 for sawn timber posts (Commodity Specification A, Use Category 4B) and for round timber posts (Commodity Specification B, Use Category 4B).

1807.3.2 Design criteria. The depth to resist lateral loads shall be determined using the design criteria established in Sections 1807.3.2.1 through 1807.3.2.3, or by other methods *approved* by the *building official*.

1807.3.2.1 Nonconstrained. The following formula shall be used in determining the depth of embedment required to resist lateral loads where lateral constraint is not provided at the ground surface, such as by a rigid floor or rigid ground surface pavement, and where lateral constraint is not provided above the ground surface, such as by a structural diaphragm.

$$d = 0.5A\{1 + [1 + (4.36h/A)]1/2\} \qquad \textbf{(Equation 18-1)}$$

where:

A = $2.34P/(S_1b)$.

b = Diameter of round post or footing or diagonal dimension of square post or footing, feet (m).

d = Depth of embedment in earth in feet (m) but not over 12 feet (3658 mm) for purpose of computing lateral pressure.

h = Distance in feet (m) from ground surface to point of application of "P."

P = Applied lateral force in pounds (kN).

S_1 = Allowable lateral soil-bearing pressure as set forth in Section 1806.2 based on a depth of one-third the depth of embedment in pounds per square foot (psf) (kPa).

1807.3.2.2 Constrained. The following formula shall be used to determine the depth of embedment required to resist lateral loads where lateral constraint is provided at the ground surface, such as by a rigid floor or pavement.

$$d = \sqrt{\frac{4.25Ph}{S_3b}} \qquad \textbf{(Equation 18-2)}$$

or alternatively

$$d = \sqrt{\frac{4.25M_g}{S_3b}} \qquad \textbf{(Equation 18-3)}$$

where:

M_g = Moment in the post at grade, in foot-pounds (kN-m).

S_3 = Allowable lateral soil-bearing pressure as set forth in Section 1806.2 based on a depth equal to the depth of embedment in pounds per square foot (kPa).

1807.3.2.3 Vertical load. The resistance to vertical loads shall be determined using the vertical foundation pressure set forth in Table 1806.2.

1807.3.3 Backfill. The backfill in the annular space around columns not embedded in poured footings shall be by one of the following methods:

tions. Such alternative methods shall be rational and the basis for all aspects and parameters of the method shall be available for peer review.

1808.6.3 Removal of expansive soil. Where expansive soil is removed in lieu of designing foundations in accordance with Section 1808.6.1 or 1808.6.2, the soil shall be removed to a depth sufficient to ensure a constant moisture content in the remaining soil. Fill material shall not contain expansive soils and shall comply with Section 1804.5 or 1804.6.

Exception: Expansive soil need not be removed to the depth of constant moisture, provided that the confining pressure in the expansive soil created by the fill and supported structure exceeds the swell pressure.

1808.6.4 Stabilization. Where the active zone of expansive soils is stabilized in lieu of designing foundations in accordance with Section 1808.6.1 or 1808.6.2, the soil shall be stabilized by chemical, dewatering, presaturation or equivalent techniques.

[S] 1808.7 ((~~Foundations on or adjacent to slopes~~)) Reserved. ((~~The placement of buildings and structures on or adjacent to slopes steeper than one unit vertical in three units horizontal (33.3 percent slope) shall comply with Sections 1808.7.1 through 1808.7.5.~~

~~**1808.7.1 Building clearance from ascending slopes.** In general, buildings below slopes shall be set a sufficient distance from the slope to provide protection from slope drainage, erosion and shallow failures. Except as provided in Section 1808.7.5 and Figure 1808.7.1, the following criteria will be assumed to provide this protection. Where the existing slope is steeper than one unit vertical in one unit horizontal (100 percent slope), the toe of the slope shall be assumed to be at the intersection of a horizontal plane drawn from the top of the foundation and a plane drawn tangent to the slope at an angle of 45 degrees (0.79 rad) to the horizontal. Where a retaining wall is constructed at the toe of the slope, the height of the slope shall be measured from the top of the wall to the top of the slope.~~

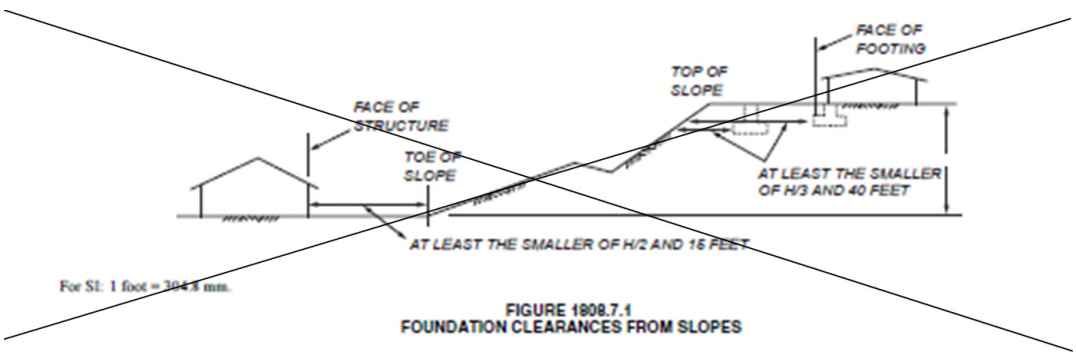

FIGURE 1808.7.1
FOUNDATION CLEARANCES FROM SLOPES

~~**1808.7.2 Foundation setback from descending slope surface.** Foundations on or adjacent to slope surfaces shall be founded in firm material with an embedment and set back from the slope surface sufficient to provide vertical and lateral support for the foundation without detrimental settlement. Except as provided for in Section 1808.7.5 and Figure 1808.7.1, the following setback is deemed adequate to meet the criteria. Where the slope is steeper than 1 unit vertical in 1 unit horizontal (100 percent slope), the required setback shall be measured from an imaginary plane 45 degrees (0.79 rad) to the horizontal, projected upward from the toe of the slope.~~

~~**1808.7.3 Pools.** The setback between pools regulated by this code and slopes shall be equal to one-half the building footing setback distance required by this section. That portion of the pool wall within a horizontal distance of 7 feet (2134 mm) from the top of the slope shall be capable of supporting the water in the pool without soil support.~~

~~**1808.7.4 Foundation elevation.** On graded sites, the top of any exterior foundation shall extend above the elevation of the street gutter at point of discharge or the inlet of an *approved* drainage device not less than 12 inches (305 mm) plus 2 percent. Alternate elevations are permitted subject to the approval of the *building official*, provided that it can be demonstrated that required drainage to the point of discharge and away from the structure is provided at all locations on the site.~~

~~**1808.7.5 Alternate setback and clearance.** Alternate setbacks and clearances are permitted, subject to the approval of the *building official*. The *building official* shall be permitted to require a geotechnical investigation as set forth in Section 1803.5.10.~~))

1808.8 Concrete foundations. The design, materials and construction of concrete foundations shall comply with Sections 1808.8.1 through 1808.8.6 and the provisions of Chapter 19.

Exception: Where concrete footings supporting walls of light-frame construction are designed in accordance with Table 1809.7, a specific design in accordance with Chapter 19 is not required.

1808.8.1 Concrete or grout strength and mix proportioning. Concrete or grout in foundations shall have a specified compressive strength (f'_c) not less than the largest applicable value indicated in Table 1808.8.1.

1810.3.9.4.2.2 Site Classes E and F. For *Site Class* E or F sites, transverse confinement reinforcement shall be provided in the element in accordance with Sections 18.7.5.2, 18.7.5.3 and 18.7.5.4 of ACI 318 within seven times the least element dimension of the pile cap and within seven times the least element dimension of the interfaces of strata that are hard or stiff and strata that are liquefiable or are composed of soft- to medium-stiff clay.

1810.3.9.5 Belled drilled shafts. Where drilled shafts are belled at the bottom, the edge thickness of the bell shall be not less than that required for the edge of footings. Where the sides of the bell slope at an angle less than 60 degrees (1 rad) from the horizontal, the effects of vertical shear shall be considered.

1810.3.9.6 Socketed drilled shafts. Socketed drilled shafts shall have a permanent pipe or tube casing that extends down to bedrock and an uncased socket drilled into the bedrock, both filled with concrete. Socketed drilled shafts shall have reinforcement or a structural steel core for the length as indicated by an *approved* method of analysis.

The depth of the rock socket shall be sufficient to develop the full load-bearing capacity of the element with a minimum safety factor of two, but the depth shall be not less than the outside diameter of the pipe or tube casing. The design of the rock socket is permitted to be predicated on the sum of the allowable load-bearing pressure on the bottom of the socket plus bond along the sides of the socket.

Where a structural steel core is used, the gross cross-sectional area of the core shall not exceed 25 percent of the gross area of the drilled shaft.

1810.3.10 Micropiles. Micropiles shall be designed and detailed in accordance with Sections 1810.3.10.1 through 1810.3.10.4.

1810.3.10.1 Construction. Micropiles shall develop their load-carrying capacity by means of a bond zone in soil, bedrock or a combination of soil and bedrock. Micropiles shall be grouted and have either a steel pipe or tube or steel reinforcement at every section along the length. It shall be permitted to transition from deformed reinforcing bars to steel pipe or tube reinforcement by extending the bars into the pipe or tube section by not less than their development length in tension in accordance with ACI 318.

1810.3.10.2 Materials. Reinforcement shall consist of deformed reinforcing bars in accordance with ASTM A615 Grade 60 or 75 or ASTM A722 Grade 150.

The steel pipe or tube shall have a minimum wall thickness of 3/16 inch (4.8 mm). Splices shall comply with Section 1810.3.6. The steel pipe or tube shall have a minimum yield strength of 45,000 psi (310 MPa) and a minimum elongation of 15 percent as shown by mill certifications or two coupon test samples per 40,000 pounds (18 160 kg) of pipe or tube.

1810.3.10.3 Reinforcement. For micropiles or portions thereof grouted inside a temporary or permanent casing or inside a hole drilled into bedrock or a hole drilled with grout, the steel pipe or tube or steel reinforcement shall be designed to carry not less than 40 percent of the design compression load. Micropiles or portions thereof grouted in an open hole in soil without temporary or permanent casing and without suitable means of verifying the hole diameter during grouting shall be designed to carry the entire compression load in the reinforcing steel. Where a steel pipe or tube is used for reinforcement, the portion of the grout enclosed within the pipe is permitted to be included in the determination of the allowable stress in the grout.

[S] 1810.3.10.4 Seismic reinforcement. For structures assigned to *Seismic Design Category* C, a permanent steel casing shall be provided from the top of the micropile down to the point of zero curvature. For structures assigned to *Seismic Design Category* D, E or F, the micropile shall be considered as an alternative system in accordance with Section ((~~104.11~~)) 104.5. The alternative system design, supporting documentation and test data shall be submitted to the *building official* for review and approval.

1810.3.11 Pile caps. Pile caps shall be of reinforced concrete, and shall include all elements to which vertical deep foundation elements are connected, including grade beams and mats. The soil immediately below the pile cap shall not be considered as carrying any vertical load, with the exception of a combined pile raft. The tops of vertical deep foundation elements shall be embedded not less than 3 inches (76 mm) into pile caps and the caps shall extend not less than 4 inches (102 mm) beyond the edges of the elements. The tops of elements shall be cut or chipped back to sound material before capping.

1810.3.11.1 Seismic Design Categories C through F. For structures assigned to *Seismic Design Category* C, D, E or F, concrete deep foundation elements shall be connected to the pile cap by embedding the element reinforcement or field-placed dowels anchored in the element into the pile cap for a distance equal to their development length in accordance with ACI 318. It shall be permitted to connect precast prestressed piles to the pile cap by developing the element prestressing strands into the pile cap provided that the connection is ductile. For deformed bars, the development length is the full development length for compression, or tension in the case of uplift, without reduction for excess reinforcement in accordance with Section 25.4.10 of ACI 318. Alternative measures for laterally confining concrete and maintaining toughness and ductile-like behavior at the top of the element shall be permitted provided that the design is such that any hinging occurs in the confined region.

The minimum transverse steel ratio for confinement shall be not less than one-half of that required for columns.

2. For a micropile or portion thereof grouted in an open drill hole in soil without temporary casing, the minimum design diameter of the drill hole shall be verified by a suitable device during grouting.
3. For micropiles designed for end bearing, a suitable means shall be employed to verify that the bearing surface is properly cleaned prior to grouting.
4. Subsequent micropiles shall not be drilled near elements that have been grouted until the grout has had sufficient time to harden.
5. Micropiles shall be grouted as soon as possible after drilling is completed.
6. For micropiles designed with a full-length casing, the casing shall be pulled back to the top of the bond zone and reinserted or some other suitable means employed to ensure grout coverage outside the casing.

1810.4.11 Helical piles. Helical piles shall be installed to specified embedment depth and torsional resistance criteria as determined by a *registered design professional*. The torque applied during installation shall not exceed the maximum allowable installation torque of the helical pile.

1810.4.12 Special inspection. *Special inspections* in accordance with Sections 1705.7 and 1705.8 shall be provided for driven and cast-in-place deep foundation elements, respectively. *Special inspections* in accordance with Section 1705.9 shall be provided for helical piles.

[S] SECTION 1811
METHANE REDUCTION MEASURES

[S] 1811.1 Applicability. This section applies to all construction activities on or within 1,000 feet (305 m) of an active, closed or abandoned landfill (landfill zone) that has been identified by the *building official* to be generating levels of methane gas on-site at the lower explosive limits or greater levels. The distance shall be calculated from the location of the proposed structure to the nearest property line of the active or former landfill site. The *building official* is permitted to waive these requirements if technical studies demonstrate that dangerous amounts of methane are not present on the location of the proposed structure.

[S] 1811.2 Protection of Structures. All enclosed structures to be built within the 1,000 foot (305 m) landfill zone shall be protected from potential methane migration. The method for protecting a structure from methane shall be identified in a report prepared by a licensed civil engineer and submitted by the applicant to the *building official* for approval. The report shall contain a description of the investigation and recommendations for preventing the accumulation of explosive concentrations of methane gas within or under enclosed portions of the building or structure. At the time of final inspection, the civil engineer shall furnish a signed statement attesting that, to the best of the engineer's knowledge, the building or structure has been constructed in accordance with the recommendations for addressing methane gas migration.

SECTION 1903
SPECIFICATIONS FOR TESTS AND MATERIALS

1903.1 General. Materials used to produce concrete, concrete itself and testing thereof shall comply with the applicable standards listed in ACI 318.

Exception: *The following standards as referenced in Chapter 35 shall be permitted to be used.*

1. *ASTM C150*
2. *ASTM C595*
3. *ASTM C1157*

1903.2 Special inspections. *Where required, special inspections and tests shall be in accordance with Chapter 17.*

1903.3 Glass fiber-reinforced concrete. *Glass fiber-reinforced concrete (GFRC) and the materials used in such concrete shall be in accordance with the PCI MNL 128 standard.*

1903.4 Flat wall insulating concrete form (ICF) systems. *Insulating concrete form material used for forming flat concrete walls shall conform to ASTM E2634.*

SECTION 1904
DURABILITY REQUIREMENTS

1904.1 Structural concrete. Structural concrete shall conform to the durability requirements of ACI 318.

Exception: *For Group R-2 and R-3 occupancies not more than three stories above grade plane, the specified compressive strength, f'_c, for concrete in basement walls, foundation walls, exterior walls and other vertical surfaces exposed to the weather shall be not less than 3,000 psi (20.7 MPa).*

[S] 1904.2 Nonstructural concrete. *The registered design professional shall assign nonstructural concrete a freeze-thaw exposure class, as defined in ACI 318, based on the anticipated exposure of nonstructural concrete. Nonstructural concrete shall have a minimum specified compressive strength, f'_c, of 2,500 psi (17.2 MPa) for Class F0; 3,000 psi (20.7 MPa) for Class F1; and 3,500 psi (24.1 MPa) for Classes F2 and F3. Nonstructural concrete shall be air entrained in accordance with ACI 318.*

Code Alternate CA1904.2: Five-sack 2000 psi (13.8 MPa) and five 1/2-sack 2500 psi (17.2 MPa) concrete mixes shall be deemed to comply with the requirements for 3000 psi (20.7 MPa) concrete in Sections 1904.1 and 1904.2. Air-entrainment is not required for durability purposes. Mixes shall be proportioned to produce a 5-inch or less slump, with a maximum allowable tolerance of 1-inch plus.

SECTION 1905
MODIFICATIONS TO ACI 318

[S] 1905.1 General. The text of ACI 318 shall be modified as indicated in Sections 1905.1.1 through ((~~1905.1.8~~)) 1905.1.10.

1905.1.1 ACI 318, Section 2.3. Modify existing definitions and add the following definitions to ACI 318, Section 2.3.

DESIGN DISPLACEMENT. Total lateral displacement expected for the design-basis earthquake, *as specified by Section 12.8.6 of ASCE 7.*

DETAILED PLAIN CONCRETE STRUCTURAL WALL. A wall complying with the requirements of Chapter 14, including 14.6.2.

ORDINARY PRECAST STRUCTURAL WALL. A precast wall complying with the requirements of Chapters 1 through 13, 15, 16 and 19 through 26.

ORDINARY REINFORCED CONCRETE STRUCTURAL WALL. A *cast-in-place* wall complying with the requirements of Chapters 1 through 13, 15, 16 and 19 through 26.

ORDINARY STRUCTURAL PLAIN CONCRETE WALL. A wall complying with the requirements of Chapter 14, *excluding 14.6.2.*

SPECIAL STRUCTURAL WALL. A cast-in-place or precast wall complying with the requirements of 18.2.4 through 18.2.8, 18.10 and 18.11, as applicable, in addition to the requirements for ordinary reinforced concrete structural walls *or ordinary precast structural walls, as applicable. Where ASCE 7 refers to a "special reinforced concrete structural wall," it shall be deemed to mean a "special structural wall."*

1905.1.2 ACI 318, Section 18.2.1. Modify ACI 318 Sections 18.2.1.2 and 18.2.1.6 to read as follows:

18.2.1.2 – Structures assigned to Seismic Design Category A shall satisfy requirements of Chapters 1 through 17 and 19 through 26*; Chapter 18 does not apply.* Structures assigned to *Seismic Design Category* B, C, D, E or F shall satisfy

2.3. Anchors are located a minimum of 1-3/4 inches (45 mm) from the edge of the concrete parallel to the length of the track.

2.4. Anchors are located a minimum of 15 anchor diameters from the edge of the concrete perpendicular to the length of the track.

2.5. The track is 33 to 68 mil (0.84 mm to 1.73 mm) designation thickness.

Allowable in-plane shear strength of exempt anchors, parallel to the edge of concrete, shall be permitted to be determined in accordance with AISI S100 Section E3.3.1.

3. In light-frame construction bearing or nonbearing walls, shear strength of concrete anchors less than or equal to 1 inch [25 mm] in diameter attaching sill plate or track to foundation or foundation stem wall need not satisfy 17.2.3.5.3(a) through (c) when the design strength of the anchors is determined in accordance with 17.5.2.1(c).

[S] 1905.1.9 ACI 318, Section 19.2.1.2. Modify ACI 318, Section 19.2.1.2, to read as follows:

19.2.1.2 The specified compressive strength shall be used for proportioning of concrete mixtures in Section 26.4.3 and for testing and acceptance of concrete in Section 26.12.3.

Exception: Concrete is permitted to be designed and constructed in accordance with Section 1905.1.10.

[S] 1905.1.10 ACI 318, Section 26.4.3. Modify ACI 318, Section 26.4.3 by adding new Section 26.4.3.2 as follows:

Concrete proportioning in accordance with Table 1905.1.10 is permitted to be used for concrete to be made with cements meeting strength requirements for Type I, II, or III of ASTM C 150. Table 1905.1.10 shall not be used to proportion concrete containing lightweight aggregates. If approved by the building official, Table 1905.1.10 is permitted to be used with air-entraining admixtures (conforming to ASTM C260) and/or normal-range water-reducing admixtures (conforming to ASTM C494-11 Standard Specification for Chemical Admixtures for Concrete, Types A, D or E; or C618-12 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete). For strengths greater than 4000 psi (27.7 MPa), proportions shall be established on the basis of field experience and trial mixtures according to ACI Section 26.4.3.1(b) or by proportioning without field mixtures or trial mixtures according to ACI Section 26.4.4.1(b). When approved by the building official, concrete proportions shall be determined in accordance with the provisions of ACI 318, Section 26.4.3.1(b) or 26.4.4.1(b).

[S] TABLE 1905.1.10
MINIMUM PERMISSIBLE CEMENT CONTENT FOR CONCRETE
(Strength Data from Trial Batches or Field Experience are not Available)

SPECIFIED 28-DAY COMPRESSIVE STRENGTH IN psi (f'_{cc})	MINIMUM PERMISSIBLE CEMENT CONTENT IN lb/cu yd	MINIMUM PERMISSIBLE CEMENT CONTENT IN STD. 94-lb SACKS/cu yd
2000	423	4 1/2[1]
2500	470	5[1]
3000	517	5 1/2
4000[2]	611	6 1/2

1. Where special inspection is not required under Section 1705, the minimum permissible cement content shall be increased by 1/2 sack per cubic yard of concrete.
2. For strengths above 4000 psi, see Section 1905.1.10.

SECTION 1906
STRUCTURAL PLAIN CONCRETE

1906.1 Scope. The design and construction of structural plain concrete, both cast-in-place and precast, shall comply with the minimum requirements of ACI 318, as modified in Section 1905.

Exception: For Group R-3 occupancies and buildings of other occupancies less than two stories above grade plane of light-frame construction, the required footing thickness of ACI 318 is permitted to be reduced to 6 inches (152 mm), provided that the footing does not extend more than 4 inches (102 mm) on either side of the supported wall.

SECTION 1907
MINIMUM SLAB PROVISIONS

1907.1 General. The thickness of concrete floor slabs supported directly on the ground shall be not less than 3-1/2 inches (89 mm). A 6-mil (0.006 inch; 0.15 mm) polyethylene vapor retarder with joints lapped not less than 6 inches (152 mm) shall be placed between the base course or subgrade and the concrete floor slab, or other *approved* equivalent methods or materials shall be used to retard vapor transmission through the floor slab.

SECTION 2104
CONSTRUCTION

2104.1 Masonry construction. Masonry construction shall comply with the requirements of Sections 2104.1.1 through 2104.1.3 and with the requirements of either TMS 602 or TMS 604.

2104.1.1 Support on wood. Masonry shall not be supported on wood girders or other forms of wood construction except as permitted in Section 2304.13.

2104.1.2 Molded cornices. Unless structural support and anchorage are provided to resist the overturning moment, the center of gravity of projecting masonry or molded cornices shall lie within the middle one-third of the supporting wall. Terra cotta and metal cornices shall be provided with a structural frame of *approved* noncombustible material anchored in an *approved* manner.

SECTION 2105
QUALITY ASSURANCE

2105.1 General. A quality assurance program shall be used to ensure that the constructed masonry is in compliance with the *approved construction documents*.

The quality assurance program shall comply with the inspection and testing requirements of Chapter 17 and TMS 602.

SECTION 2106
SEISMIC DESIGN

2106.1 Seismic design requirements for masonry. Masonry structures and components shall comply with the requirements in Chapter 7 of TMS 402 depending on the structure's *seismic design category*.

SECTION 2107
ALLOWABLE STRESS DESIGN

[W] 2107.1 General. The design of masonry structures using *allowable stress design* shall comply with Section 2106 and the requirements of Chapters 1 through 8 of TMS 402/ACI 530/ASCE 5 except as modified by Sections 2107.2 through ((~~2107.3~~)) 2107.4.

[W] 2107.2 TMS 402/ACI 530/ASCE 5, Section ((~~6.1.6.1.1~~)) 2.1.8.7.1.1, lap splices. ((~~As an alternative to~~)) In lieu of Section ((~~6.1.6.1.1~~)) 2.1.8.7.1.1, it shall be permitted to design lap splices in accordance with Section 2107.2.1.

2107.2.1 Lap splices. The minimum length of lap splices for reinforcing bars in tension or compression, l_d, shall be:

$$l_d = 0.002 d_b f_s \qquad \textbf{(Equation 21-1)}$$

For SI: $l_d = 0.29 d_b f_s$

but not less than 12 inches (305 mm). The length of the lapped splice shall be not less than 40 bar diameters.

where:

d_b = Diameter of reinforcement, inches (mm).

f_s = Computed stress in reinforcement due to design loads, psi (MPa).

In regions of moment where the design tensile stresses in the reinforcement are greater than 80 percent of the allowable steel tension stress, F_s, the lap length of splices shall be increased not less than 50 percent of the minimum required length, but need not be greater than 72 d_b. Other equivalent means of stress transfer to accomplish the same 50 percent increase shall be permitted. Where epoxy coated bars are used, lap length shall be increased by 50 percent.

2107.3 TMS 402, Section 6.1.6.1, splices of reinforcement. Modify Section 6.1.6.1 as follows:

6.1.6.1 – Splices of reinforcement. Lap splices, welded splices or mechanical splices are permitted in accordance with the provisions of this section. Welding shall conform to AWS D1.4. Welded splices shall be of ASTM A706 steel reinforcement. Reinforcement larger than No. 9 (M #29) shall be spliced using mechanical connections in accordance with Section 6.1.6.1.3.

SECTION 2108
STRENGTH DESIGN OF MASONRY

2108.1 General. The design of masonry structures using strength design shall comply with Section 2106 and the requirements of Chapters 1 through 7 and Chapter 9 of TMS 402, except as modified by Sections 2108.2 through 2108.3.

the chimney. Straps shall be hooked around the outer bars and extend 6 inches (152 mm) beyond the bend. Each strap shall be fastened to not fewer than four floor joists with two 1/2-inch (12.7 mm) bolts.

Exception: Seismic anchorage is not required for the following:

1. In structures assigned to *Seismic Design Category* A or B.
2. Where the masonry fireplace is constructed completely within the exterior walls.

2111.6 Firebox walls. Masonry fireboxes shall be constructed of solid masonry units, hollow masonry units grouted solid, stone or concrete. Where a lining of firebrick not less than 2 inches (51 mm) in thickness or other *approved* lining is provided, the minimum thickness of back and sidewalls shall each be 8 inches (203 mm) of solid masonry, including the lining. The width of joints between firebricks shall be not greater than 1/4 inch (6.4 mm). Where a lining is not provided, the total minimum thickness of back and sidewalls shall be 10 inches (254 mm) of solid masonry. Firebrick shall conform to ASTM C27 or ASTM C1261 and shall be laid with medium-duty refractory mortar conforming to ASTM C199.

2111.6.1 Steel fireplace units. Steel fireplace units are permitted to be installed with solid masonry to form a masonry fireplace provided that they are installed according to either the requirements of their listing or the requirements of this section. Steel fireplace units incorporating a steel firebox lining shall be constructed with steel not less than 1/4 inch (6.4 mm) in thickness, and an air-circulating chamber that is ducted to the interior of the building. The firebox lining shall be encased with solid masonry to provide a total thickness at the back and sides of not less than 8 inches (203 mm), of which not less than 4 inches (102 mm) shall be of solid masonry or concrete. Circulating air ducts employed with steel fireplace units shall be constructed of metal or masonry.

2111.7 Firebox dimensions. The firebox of a concrete or masonry fireplace shall have a minimum depth of 20 inches (508 mm). The throat shall be not less than 8 inches (203 mm) above the fireplace opening. The throat opening shall be not less than 4 inches (102 mm) in depth. The cross-sectional area of the passageway above the firebox, including the throat, damper and smoke chamber, shall be not less than the cross-sectional area of the flue.

Exception: Rumford fireplaces shall be permitted provided that the depth of the fireplace is not less than 12 inches (305 mm) and not less than one-third of the width of the fireplace opening, and the throat is not less than 12 inches (305 mm) above the lintel, and not less than 1/20 the cross-sectional area of the fireplace opening.

[W] 2111.8 Fireplaces. Fireplaces shall be provided with each of the following:

1. Tightly fitting flue dampers, operated by a readily accessible manual or *approved* automatic control.

   Exception: Fireplaces with gas logs shall be installed in accordance with *International Mechanical Code* Section 901, except that the standards for liquefied petroleum gas installations shall be NFPA 58 (*Liquefied Petroleum Gas Code*) and NFPA 54 (*National Fuel Gas Code*).

2. An outside source for combustion air ducted into the firebox. The duct shall be at least 6 square inches and shall be provided with an operable outside air duct damper.

   Exception: Washington certified fireplaces shall be installed with the combustion air systems necessary for their safe and efficient combustion and specified by the manufacturer in accordance with Section 2115.

3. Site built fireplaces shall have tight fitting glass or metal doors, or a flue draft induction fan or as *approved* for minimizing back-drafting. Factory built fireplaces shall use doors listed for the installed appliance.

2111.8.1 Lintel and throat. Masonry over a fireplace opening shall be supported by a lintel of noncombustible material. The minimum required bearing length on each end of the fireplace opening shall be 4 inches (102 mm). The fireplace throat or damper shall be located not less than 8 inches (203 mm) above the top of the fireplace opening.

((~~2111.8.1~~)) 2111.8.2 Damper. Masonry fireplaces shall be equipped with a ferrous metal damper located not less than 8 inches (203 mm) above the top of the fireplace opening. Dampers shall be installed in the fireplace or at the top of the flue venting the fireplace, and shall be operable from the room containing the fireplace. Damper controls shall be permitted to be located in the fireplace.

2111.9 Smoke chamber walls. Smoke chamber walls shall be constructed of solid masonry units, hollow masonry units grouted solid, stone or concrete. The total minimum thickness of front, back and sidewalls shall be 8 inches (203 mm) of solid masonry. The inside surface shall be parged smooth with refractory mortar conforming to ASTM C199. Where a lining of firebrick not less than 2 inches (51 mm) thick, or a lining of vitrified clay not less than 5/8 inch (15.9 mm) thick, is provided, the total minimum thickness of front, back and sidewalls shall be 6 inches (152 mm) of solid masonry, including the lining. Firebrick shall conform to ASTM C1261 and shall be laid with refractory mortar conforming to ASTM C199. Vitrified clay linings shall conform to ASTM C315.

2111.9.1 Smoke chamber dimensions. The inside height of the smoke chamber from the fireplace throat to the beginning of the flue shall be not greater than the inside width of the fireplace opening. The inside surface of the smoke chamber shall not be inclined more than 45 degrees (0.76 rad) from vertical where prefabricated smoke chamber linings are used or where the

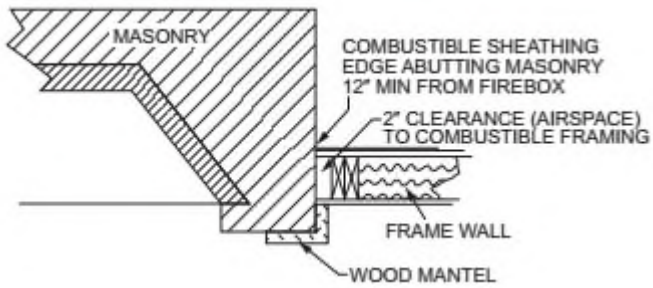

FIGURE 2113.19
ILLUSTRATION OF EXCEPTION THREE CHIMNEY CLEARANCE PROVISION

2113.20 Chimney fireblocking. All spaces between chimneys and floors and ceilings through which chimneys pass shall be fireblocked with noncombustible material securely fastened in place. The fireblocking of spaces between wood joists, beams or headers shall be self-supporting or be placed on strips of metal or metal lath laid across the spaces between combustible material and the chimney.

SECTION 2114
DRY-STACK MASONRY

2114.1 General. The design of dry-stack masonry structures shall comply with the requirements of Chapters 1 through 8 of TMS 402 except as modified by Sections 2114.2 through 2114.5.

2114.2 Limitations. Dry-stack masonry shall be prohibited in Risk Category IV structures.

2114.3 Materials. Concrete masonry units complying with ASTM C90 shall be used.

2114.4 Strength. Dry-stack masonry shall be of adequate strength and proportions to support all superimposed loads without exceeding the allowable stresses listed in Table 2114.4. Allowable stresses not specified in Table 2114.4 shall comply with the requirements of Chapter 8 of TMS 402.

TABLE 2114.4
GROSS CROSS-SECTIONAL AREA ALLOWABLE STRESS FOR DRY-STACK MASONRY

DESCRIPTION	MAXIMUM ALLOWABLE STRESS (psi)
Compression	45
Flexural tension Horizontal span Vertical span	 30 18
Shear	10

For SI:1 pound per square inch = 0.006895 MPa.

2114.5 Construction. Construction of dry-stack masonry shall comply with ASTM C946.

[S] SECTION 2115
EMISSION STANDARDS

[S] 2115.1 Emission standards for factory-built fireplaces. New and used factory-built fireplaces shall be certified and labeled in accordance with procedures and criteria specified in ASTM E2558 Standard Test Method for Determining Particulate Matter Emission from Fires in Low Mass Wood-burning Fireplaces.

To certify an entire fireplace model line, the internal assembly shall be tested to determine its particulate matter emission performance. Retesting and recertifying is required if the design and construction specifications of the fireplace model line internal assembly change. Testing for certification shall be performed by a Washington State Department of Ecology (DOE) approved and U. S. Environmental Protection Agency (EPA) accredited laboratory.

[S] 2115.2 Emission standards for certified masonry and concrete fireplaces. Masonry and concrete fireplace model lines certified to Washington State Building Code Standard 31-2 prior to July 1, 2013 may retain certification if the design and construction specifications of the fireplace model line internal assembly do not change.

14. Required permanent individual truss member restraint location and the method and details of restraint/bracing to be used in accordance with Section 2303.4.1.2.

[S] 2303.4.1.2 Permanent individual truss member restraint. Where permanent restraint of truss members is required on the truss design drawings, it shall be accomplished by one of the following methods:

1. Permanent individual truss member restraint/bracing shall be installed using standard industry lateral restraint/bracing details in accordance with generally accepted engineering practice. Locations for lateral restraint shall be identified on the truss design drawing.
2. The trusses shall be designed so that the buckling of any individual truss member is resisted internally by the individual truss through suitable means (for example, buckling reinforcement by T-reinforcement or L-reinforcement, proprietary reinforcement). The buckling reinforcement of individual members of the trusses shall be installed as shown on the truss design drawing or on supplemental truss member buckling reinforcement details provided by the truss designer.
3. A project-specific permanent individual truss member restraint/bracing design shall be permitted to be specified by any qualified *registered design professional*.

2303.4.1.3 Trusses spanning 60 feet or greater. The owner or the owner's authorized agent shall contract with any qualified *registered design professional* for the design of the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing for all trusses with clear spans 60 feet (18 288 mm) or greater.

2303.4.1.4 Truss designer. The individual or organization responsible for the design of trusses.

2303.4.1.4.1 Truss design drawings. Where required by the *registered design professional*, the *building official* or the statutes of the jurisdiction in which the project is to be constructed, each individual truss design drawing shall bear the seal and signature of the truss designer.

Exceptions:

1. Where a cover sheet and truss index sheet are combined into a single sheet and attached to the set of truss design drawings, the single cover/truss index sheet is the only document required to be signed and sealed by the truss designer.
2. Where a cover sheet and a truss index sheet are separately provided and attached to the set of truss design drawings, the cover sheet and the truss index sheet are the only documents required to be signed and sealed by the truss designer.

2303.4.2 Truss placement diagram. The truss manufacturer shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design drawing. The truss placement diagram shall be provided as part of the truss submittal package, and with the shipment of trusses delivered to the job site. Truss placement diagrams that serve only as a guide for installation and do not deviate from the *permit* submittal drawings shall not be required to bear the seal or signature of the truss designer.

2303.4.3 Truss submittal package. The truss submittal package provided by the truss manufacturer shall consist of each individual truss design drawing, the truss placement diagram, the permanent individual truss member restraint/bracing method and details and any other structural details germane to the trusses; and, as applicable, the cover/truss index sheet.

2303.4.4 Anchorage. The design for the transfer of loads and anchorage of each truss to the supporting structure is the responsibility of the *registered design professional*.

2303.4.5 Alterations to trusses. Truss members and components shall not be cut, notched, drilled, spliced or otherwise altered in any way without written concurrence and approval of a *registered design professional*. Alterations resulting in the addition of loads to any member (for example, HVAC equipment, piping, additional roofing or insulation) shall not be permitted without verification that the truss is capable of supporting such additional loading.

[S] 2303.4.6 TPI 1 specifications. In addition to Sections 2303.4.1 through 2303.4.5, the design, manufacture and quality assurance of metal-plate-connected wood trusses shall be in accordance with TPI 1. Job-site inspections shall be in compliance with Section ((~~110.4~~)) 108, as applicable.

2303.4.7 Truss quality assurance. Trusses not part of a manufacturing process in accordance with either Section 2303.4.6 or a referenced standard, which provides requirements for quality control done under the supervision of a third-party quality control agency, shall be manufactured in compliance with Sections 1704.2.5 and 1705.5, as applicable.

2303.5 Test standard for joist hangers. Joist hangers shall be in accordance with ASTM D7147.

[W] 2303.6 Nails and staples. Nails and staples shall conform to requirements of ASTM F1667, including Supplement 1. Nails used for framing and sheathing connections shall have minimum average bending yield strengths as follows: 80 kips per square inch (ksi) (551 MPa) for shank diameters larger than 0.177 inch (4.50 mm) but not larger than 0.254 inch (6.45 mm), 90 ksi (620 MPa) for shank diameters larger than 0.142 inch (3.61 mm) but not larger than 0.177 inch (4.50 mm) and 100 ksi (689 MPa) for shank diameters of not less than 0.099 inch (2.51 mm) but not larger than 0.142 inch (3.61 mm). Staples used for framing and sheathing connec-

tions shall have minimum average bending moments as follows: 3.6 in.-lbs (0.41 N-m) for No. 16 gage staples, 4.0 in.-lbs (0.45 N-m) for No. 15 gage staples, and 4.3 in.-lbs (0.49 N-m) for No. 14 gage staples. Staples allowable bending moments shall be listed on the construction documents.

2303.7 Shrinkage. Consideration shall be given in design to the possible effect of cross-grain dimensional changes considered vertically that may occur in lumber fabricated in a green condition.

SECTION 2304
GENERAL CONSTRUCTION REQUIREMENTS

2304.1 General. The provisions of this section apply to design methods specified in Section 2302.1.

2304.2 Size of structural members. Computations to determine the required sizes of members shall be based on the net dimensions (actual sizes) and not nominal sizes.

2304.3 Wall framing. The framing of exterior and interior walls shall be in accordance with the provisions specified in Section 2308 unless a specific design is furnished.

2304.3.1 Bottom plates. Studs shall have full bearing on a 2-inch-thick (actual 1-1/2-inch, 38 mm) or larger plate or sill having a width not less than equal to the width of the studs.

2304.3.2 Framing over openings. Headers, double joists, trusses or other *approved* assemblies that are of adequate size to transfer loads to the vertical members shall be provided over window and door openings in load-bearing walls and partitions.

2304.3.3 Shrinkage. Wood walls and bearing partitions shall not support more than two floors and a roof unless an analysis satisfactory to the *building official* shows that shrinkage of the wood framing will not have adverse effects on the structure or any plumbing, electrical or mechanical systems or other equipment installed therein due to excessive shrinkage or differential movements caused by shrinkage. The analysis shall show that the roof drainage system and the foregoing systems or equipment will not be adversely affected or, as an alternate, such systems shall be designed to accommodate the differential shrinkage or movements.

2304.4 Floor and roof framing. The framing of wood-joisted floors and wood-framed roofs shall be in accordance with the provisions specified in Section 2308 unless a specific design is furnished.

2304.5 Framing around flues and chimneys. Combustible framing shall be not less than 2 inches (51 mm), but shall be not less than the distance specified in Sections 2111 and 2113 and the *International Mechanical Code*, from flues, chimneys and fireplaces, and 6 inches (152 mm) away from flue openings.

2304.6 Exterior wall sheathing. Wall sheathing on the outside of exterior walls, including gables, and the connection of the sheathing to framing shall be designed in accordance with the general provisions of this code and shall be capable of resisting wind pressures in accordance with Section 1609.

2304.6.1 Wood structural panel sheathing. Where wood structural panel sheathing is used as the exposed finish on the outside of exterior walls, it shall have an exterior exposure durability classification. Where wood structural panel sheathing is used elsewhere, but not as the exposed finish, it shall be of a type manufactured with exterior glue (Exposure 1 or Exterior). Wood structural panel sheathing, connections and framing spacing shall be in accordance with Table 2304.6.1 for the applicable wind speed and exposure category where used in enclosed buildings with a mean roof height not greater than 30 feet (9144 mm) and a topographic factor (K_{zt}) of 1.0.

TABLE 2304.6.1
MAXIMUM ALLOWABLE STRESS DESIGN WIND SPEED, V_{asd} PERMITTED FOR WOOD STRUCTURAL PANEL WALL SHEATHING USED TO RESIST WIND PRESSURES[a, b, c]

MINIMUM NAIL		MINIMUM WOOD STRUCTURAL PANEL SPAN RATING	MINIMUM NOMINAL PANEL THICKNESS (inches)	MAXIMUM WALL STUD SPACING (inches)	PANEL NAIL SPACING		MAXIMUM ALLOWABLE STRESS DESIGN WIND SPEED, V_{asd}[d] (MPH)		
							Wind exposure category		
Size	Penetration (inches)				Edges (inches o.c.)	Field (inches o.c.)	B	C	D
6d common (2.0″ × 0.113″)	1.5	24/0	3/8	16	6	12	110	90	85
		24/16	7/16	16	6	12	110	100	90
						6	150	125	110
8d common (2.5″ × 0.131″)	1.75	24/16	7/16	16	6	12	130	110	105
						6	150	125	110
				24	6	12	110	90	85
						6	110	90	85

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

2304.9.4.1 General. Two-inch (51 mm) decking shall have a maximum moisture content of 15 percent. Decking shall be machined with a single tongue-and-groove pattern. Each decking piece shall be nailed to each support.

2304.9.4.2 Nailing. Each piece of decking shall be toenailed at each support with one 16d common nail through the tongue and face-nailed with one 16d common nail.

2304.9.4.3 Controlled random pattern. There shall be a minimum distance of 24 inches (610 mm) between end joints in adjacent courses. The pieces in the first and second courses shall bear on not fewer than two supports with end joints in these two courses occurring on alternate supports. Not more than seven intervening courses shall be permitted before this pattern is repeated.

2304.9.5 Three- and four-inch sawn tongue-and-groove decking. Three- and four-inch (76 mm and 102 mm) sawn tongue-and-groove decking shall comply with Sections 2304.9.5.1 through 2304.9.5.3.

2304.9.5.1 General. Three-inch (76 mm) and four-inch (102 mm) decking shall have a maximum moisture content of 19 percent. Decking shall be machined with a double tongue-and-groove pattern. Decking pieces shall be interconnected and nailed to the supports.

2304.9.5.2 Nailing. Each piece shall be toenailed at each support with one 40d common nail and face-nailed with one 60d common nail. Courses shall be spiked to each other with 8-inch (203 mm) spikes at maximum intervals of 30 inches (762 mm) through predrilled edge holes penetrating to a depth of approximately 4 inches (102 mm). One spike shall be installed at a distance not exceeding 10 inches (254 mm) from the end of each piece.

2304.9.5.3 Controlled random pattern. There shall be a minimum distance of 48 inches (1219 mm) between end joints in adjacent courses. Pieces not bearing on a support are permitted to be located in interior bays provided that the adjacent pieces in the same course continue over the support for not less than 24 inches (610 mm). This condition shall not occur more than once in every six courses in each interior bay.

[W] 2304.10 Connectors and fasteners. Connectors and fasteners shall comply with the applicable provisions of Sections 2304.10.1 through ((~~2304.10.7~~)) 2304.10.8.

2304.10.1 Fastener requirements. Connections for wood members shall be designed in accordance with the appropriate methodology in Section 2302.1. The number and size of fasteners connecting wood members shall be not less than that set forth in Table 2304.10.1.

2304.10.6 Load path. Where wall framing members are not continuous from the foundation sill to the roof, the members shall be secured to ensure a continuous load path. Where required, sheet metal clamps, ties or clips shall be formed of galvanized steel or other *approved* corrosion-resistant material not less than 0.0329-inch (0.836 mm) base metal thickness.

2304.10.7 Framing requirements. Wood columns and posts shall be framed to provide full end bearing. Alternatively, column-and-post end connections shall be designed to resist the full compressive loads, neglecting end-bearing capacity. Column-and-post end connections shall be fastened to resist lateral and net induced uplift forces.

[W] 2304.10.8 Connection fire resistance rating. Fire resistance ratings for connections in Type IV-A, IV-B, or IV-C construction shall be determined by one of the following:

1. Testing in accordance with Section 703.2 where the connection is part of the fire resistance test.
2. Engineering analysis that demonstrates that the temperature rise at any portion of the connection is limited to an average temperature rise of 250°F (139°C), and a maximum temperature rise of 325°F (181°C), for a time corresponding to the required fire resistance rating of the structural element being connected. For the purposes of this analysis, the connection includes connectors, fasteners, and portions of wood members included in the structural design of the connection.

2304.11 Heavy timber construction. Where a structure, portion thereof or individual structural elements are required by provisions of this code to be of heavy timber, the building elements therein shall comply with the applicable provisions of Sections 2304.11.1 through 2304.11.4. Minimum dimensions of heavy timber shall comply with the applicable requirements in Table 2304.11 based on roofs or floors supported and the configuration of each structural element, or in Sections 2304.11.2 through 2304.11.4. Lumber decking shall be in accordance with Section 2304.9.

TABLE 2304.11
MINIMUM DIMENSIONS OF HEAVY TIMBER STRUCTURAL MEMBERS

		MINIMUM NOMINAL SOLID SAWN SIZE		MINIMUM GLUED-LAMINATED NET SIZE		MINIMUM STRUCTURAL COMPOSITE LUMBER NET SIZE	
SUPPORTING	HEAVY TIMBER STRUCTURAL ELEMENTS	Width, inch	Depth, inch	Width, inch	Depth, inch	Width, inch	Depth, inch
Floor loads only or combined floor and roof loads	Columns; Framed sawn or glued-laminated timber arches that spring from the floor line; Framed timber trusses	8	8	6-3/4	8-1/4	7	7-1/2
	Wood beams and girders	6	10	5	10-1/2	5-1/4	9-1/2
Roof loads only	Columns (roof and ceiling loads); Lower half of: wood-frame or glued-laminated arches that spring from the floor line or from grade	6	8	5	8-1/4	5-1/4	7-1/2
	Upper half of: wood-frame or glued-laminated arches that spring from the floor line or from grade	6	6	5	6	5-1/4	5-1/2
	Framed timber trusses and other roof framing; [a] Framed or glued-laminated arches that spring from the top of walls or wall abutments	4[b]	6	3[b]	6-7/8	3-1/2[b]	5-1/2

For SI: 1 inch = 25.4 mm.

a. Spaced members shall be permitted to be composed of two or more pieces not less than 3 inches nominal in thickness where blocked solidly throughout their intervening spaces or where spaces are tightly closed by a continuous wood cover plate of not less than 2 inches nominal in thickness secured to the underside of the members. Splice plates shall be not less than 3 inches nominal in thickness.

b. Where protected by approved automatic sprinklers under the roof deck, framing members shall be not less than 3 inches nominal in width.

2304.11.1 Details of heavy timber structural members. Heavy timber structural members shall be detailed and constructed in accordance with Sections 2304.11.1 through 2304.11.1.3.

2304.11.1.1 Columns. Minimum dimensions of columns shall be in accordance with Table 2304.11. Columns shall be continuous or superimposed throughout all stories and connected in an approved manner. Girders and beams at column connections shall be closely fitted around columns and adjoining ends shall be cross tied to each other, or intertied by caps or ties, to transfer horizontal loads across joints. Wood bolsters shall not be placed on tops of columns unless the columns support roof loads only. Where traditional heavy timber detailing is used, connections shall be by means of reinforced con-

2407.1.2 Structural glass baluster panels. Guards with structural glass baluster panels shall be installed with an attached top rail or handrail. The top rail or handrail shall be supported by not fewer than three glass baluster panels, or shall be otherwise supported to remain in place should one glass baluster panel fail.

Exception: An attached top rail or handrail is not required where the glass baluster panels are laminated glass with two or more glass plies of equal thickness and of the same glass type. The panels shall be tested to remain in place as a barrier following impact or glass breakage in accordance with ASTM E2353.

2407.1.3 Parking garages. Glazing materials shall not be installed in handrails or *guards* in parking garages except for pedestrian areas not exposed to impact from vehicles.

2407.1.4 Glazing in windborne debris regions. Glazing installed in in-fill panels or balusters in *windborne debris regions* shall comply with the following:

2407.1.4.1 Balusters and in-fill panels. Glass installed in exterior railing in-fill panels or balusters shall be laminated glass complying with Category II of CPSC 16 CFR Part 1201 or Class A of ANSI Z97.1.

2407.1.4.2 Glass supporting top rail. Where the top rail is supported by glass, the assembly shall be tested according to the impact requirements of Section 1609.2. The top rail shall remain in place after impact.

SECTION 2408
GLAZING IN ATHLETIC FACILITIES

2408.1 General. Glazing in athletic facilities and similar uses subject to impact loads, which forms whole or partial wall sections or which is used as a door or part of a door, shall comply with this section.

2408.2 Racquetball and squash courts.

2408.2.1 Testing. Test methods and loads for individual glazed areas in racquetball and squash courts subject to impact loads shall conform to those of CPSC 16 CFR Part 1201 or ANSI Z97.1 with impacts being applied at a height of 59 inches (1499 mm) above the playing surface to an actual or simulated glass wall installation with fixtures, fittings and methods of assembly identical to those used in practice.

Glass walls shall comply with the following conditions:

1. A glass wall in a racquetball or squash court, or similar use subject to impact loads, shall remain intact following a test impact.
2. The deflection of such walls shall be not greater than 1-1/2 inches (38 mm) at the point of impact for a drop height of 48 inches (1219 mm).

Glass doors shall comply with the following conditions:

1. Glass doors shall remain intact following a test impact at the prescribed height in the center of the door.
2. The relative deflection between the edge of a glass door and the adjacent wall shall not exceed the thickness of the wall plus 1/2 inch (12.7 mm) for a drop height of 48 inches (1219 mm).

2408.3 Gymnasiums and basketball courts. Glazing in multipurpose gymnasiums, basketball courts and similar athletic facilities subject to human impact loads shall comply with Category II of CPSC 16 CFR Part 1201 or Class A of ANSI Z97.1.

SECTION 2409
GLASS IN WALKWAYS, ELEVATOR HOISTWAYS AND ELEVATOR CARS

[S] 2409.1 Glass walkways. Glass installed as ((~~a part of a floor/ceiling assembly as~~)) a walking surface ((~~and constructed with~~)) shall comply with Chapter 16.

Exception: ((~~laminated~~)) Laminated glass ((~~shall comply~~)) designed in accordance with ASTM E2751 ((~~or with the load requirements specified in~~)) is not required to comply with Chapter 16.

Such assemblies shall comply with the *fire-resistance rating* and marking requirements of this code where applicable.

2409.2 Glass in elevator hoistway enclosures. Glass in elevator hoistway enclosures and hoistway doors shall be laminated glass conforming to ANSI Z97.1 or CPSC 16 CFR Part 1201.

2409.2.1 Fire-resistance-rated hoistways. Glass installed in hoistways and hoistway doors where the hoistway is required to have a fire-resistance rating shall comply with Section 716.

2409.2.2 Glass hoistway doors. The glass in glass hoistway doors shall be not less than 60 percent of the total visible door panel surface area as seen from the landing side.

2409.3 Visions panels in elevator hoistway doors. Glass in vision panels in elevator hoistway doors shall be permitted to be any transparent glazing material not less than 1/4 inch (6.4 mm) in thickness conforming to Class A in accordance with ANSI

CHAPTER 25

GYPSUM BOARD, GYPSUM PANEL PRODUCTS AND PLASTER

User notes:

About this chapter: *Chapter 25 contains the provisions and referenced standards that regulate the design, construction and quality of gypsum board, gypsum panel products and plaster and, in addition, addresses reinforced gypsum concrete. These materials are some of the most commonly used interior and exterior finish materials in the building industry. This chapter primarily addresses quality-control-related issues with regard to material specifications and installation requirements. Most products are manufactured in accordance with industry standards. The building official or inspector needs to verify that the appropriate product is used and properly installed for the intended use and location. Proper design and installation of these materials are necessary to provide weather resistance and required fire protection for both structural and nonstructural building components.*

Code development reminder: *Code change proposals to this chapter will be considered by the IBC—Structural Code Development Committee during the 2019 (Group B) Code Development Cycle. See explanation on page iv.*

SECTION 2501
GENERAL

2501.1 Scope. Provisions of this chapter shall govern the materials, design, construction and quality of gypsum board, gypsum panel products, lath, gypsum plaster, cement plaster and reinforced gypsum concrete.

2501.2 Other materials. Other *approved* wall or ceiling coverings shall be permitted to be installed in accordance with the recommendations of the manufacturer and the conditions of approval.

SECTION 2502
PERFORMANCE

2502.1 General. Lathing, plastering and gypsum board and gypsum panel product construction shall be done in the manner and with the materials specified in this chapter and, where required for fire protection, shall comply with the provisions of Chapter 7.

SECTION 2503
INSPECTION

[S] 2503.1 Inspection. Lath, gypsum board and gypsum panel products shall be inspected in accordance with Section ((~~110.3.5~~)) 108.9.

SECTION 2504
VERTICAL AND HORIZONTAL ASSEMBLIES

2504.1 Scope. The following requirements shall be met where construction involves gypsum board, gypsum panel products or lath and plaster in vertical and horizontal assemblies.

2504.1.1 Wood framing. Wood supports for lath, gypsum board or gypsum panel products, as well as wood stripping or furring, shall be not less than 2 inches (51 mm) nominal thickness in the least dimension.

Exception: The minimum nominal dimension of wood furring strips installed over solid backing shall be not less than 1 inch by 2 inches (25 mm by 51 mm).

2504.1.2 Studless partitions. The minimum thickness of vertically erected studless solid plaster partitions of 3/8-inch (9.5 mm) and 3/4-inch (19.1 mm) rib metal lath, 1/2-inch-thick (12.7 mm) gypsum lath, gypsum board or gypsum panel product shall be 2 inches (51 mm).

SECTION 2505
SHEAR WALL CONSTRUCTION

2505.1 Resistance to shear (wood framing). Wood-frame shear walls sheathed with gypsum board, gypsum panel products or lath and plaster shall be designed and constructed in accordance with Section 2306.3 and are permitted to resist wind and seismic loads. Walls resisting seismic loads shall be subject to the limitations in Section 12.2.1 of ASCE 7.

CHAPTER 27

ELECTRICAL

User note:

About this chapter: *Electrical systems and components are integral to most structures; therefore it is necessary for the code to address their installation and protection. Structures depend on electricity for the operation of many life safety systems including fire alarm, smoke control and exhaust, fire suppression, fire command and communication systems. Since power supply to these systems is essential, Chapter 27 addresses where standby and emergency power must be provided.*

SECTION 2701
GENERAL

[S] 2701.1 Scope. The provisions of this chapter and ((~~NFPA 70~~)) the *Seattle Electrical Code* shall govern the design, construction, erection and installation of the electrical components, appliances, equipment and systems used in buildings and structures covered by this code. The *International Fire Code*, the *International Property Maintenance Code* and ((~~NFPA 70~~)) the *Seattle Electrical Code* shall govern the use and maintenance of electrical components, appliances, equipment and systems. The *International Existing Building Code* and ((~~NFPA 70~~)) the *Seattle Electrical Code* shall govern the alteration, repair, relocation, replacement and addition of electrical components, appliances, or equipment and systems.

SECTION 2702
EMERGENCY AND LEGALLY REQUIRED STANDBY POWER SYSTEMS

[S][F] 2702.1 General. Emergency power systems and *legally required* standby power systems shall comply with Sections 2702.1.1 through 2702.1.8.

[F] 2702.1.1 Stationary generators. Stationary emergency and legally required standby power generators required by this code shall be listed in accordance with UL 2200.

[F] 2702.1.2 Fuel-line piping protection. Fuel lines supplying a generator set inside a *high-rise building* shall be separated from areas of the *building* other than the room the generator is located in by an *approved* method, or an assembly that has a fire-resistance rating of not less than ((~~2 hours. Where the *building* is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, the required fire-resistance rating shall be reduced to~~)) 1 hour.

[F] 2702.1.3 Installation. Emergency power systems and *legally required* standby power systems required by this code or the *International Fire Code* shall be installed in accordance with the *International Fire Code*, ((~~NFPA 70~~)) the *Seattle Electrical Code*, NFPA 110 and NFPA 111.

Exceptions:

1. Where located within a sprinklered parking garage of Type I or II construction, emergency power and *legally required standby power systems* with fixed fuel quantities meeting the limits of Section 603.3 of the *International Fire Code*, and their transfer switches, are not required to be in a separate room. Other occupancies located in the *story* where the system is located shall be separated from the system by fire barriers with a minimum 1 hour fire-resistance rating.
2. Combustion and radiator intake air are permitted to be transferred from the adjacent garage. Radiator discharge air is permitted to be transferred to the adjacent garage. Radiator ventilation intake and discharge air locations shall be separated to maintain the radiator ventilation intake air temperature below the maximum temperature allowed to meet the emergency and *legally required standby power system* loads.

[F] 2702.1.4 Load transfer. Emergency power systems shall automatically provide secondary power within 10 seconds after primary power is lost, unless specified otherwise in this code. ((~~Standby~~)) *Legally required standby* power systems shall automatically provide secondary power within 60 seconds after primary power is lost, unless specified otherwise in this code.

[W][S][F] 2702.1.5 Load duration. *Emergency power systems* and *legally required standby power systems* shall be designed to provide the required power for a minimum duration of ((~~2~~)) 8 hours without being refueled or recharged, unless specified otherwise in this code.

EXCEPTION: The minimum duration of all required power loads may be reduced to 2 hours for all systems except for fire pumps that require a minimum duration of 8 hours in accordance with NFPA 20.

[F] 2702.1.6 Uninterruptable power source. An uninterrupted source of power shall be provided for equipment where required by the manufacturer's instructions, the listing, this code or applicable referenced standards.

[F] 2702.1.7 Interchangeability. Emergency power systems shall be an acceptable alternative for installations that require standby power systems.

[F] 2702.1.8 Group I-2 occupancies. In Group I-2 occupancies located in flood hazard areas established in Section 1612.3, where new essential electrical systems are installed, and where new essential electrical system generators are installed, the systems and generators shall be located and installed in accordance with ASCE 24. Where connections for hookup of temporary generators are provided, the connections shall be located at or above the elevation required in ASCE 24.

[S][F] 2702.2 Where required. Emergency and *legally required* standby power systems shall be provided where required by Sections 2702.2.1 through 2702.2.18 and other sections of this code.

[F] 2702.2.1 Ambulatory care facilities. Essential electrical systems for ambulatory care facilities shall comply with Section 422.6.

[S][F] 2702.2.2 Elevators and platform lifts. ((~~Standby~~)) Legally required standby power shall be provided for elevators and platform lifts used as accessible *means of egress* as required in Sections 1009.4.1 ((~~,~~)) and 1009.5. ((~~, 3003.1, 3007.8 and 3008.8.~~)) Emergency power shall be provided for elevators in high-rise buildings as required in Section 403.4.8.4.

[S][F] 2702.2.3 Emergency responder radio coverage systems. Emergency power shall be provided for emergency responder radio coverage systems in high-rise buildings as required in Section 403.4.8.4. ((~~Standby~~)) Legally required standby power shall be provided for other emergency responder radio coverage systems required in ((~~Section 918 and~~)) the *International Fire Code*. ((~~The standby power supply shall be capable of operating the emergency responder radio coverage system for a duration of not less than 12 hours at 100-percent system operation capacity.~~))

[F] 2702.2.4 Emergency voice/alarm communication systems. Emergency power shall be provided for emergency voice/alarm communication systems as required in Section 907.5.2.2.5. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in NFPA 72.

[F] 2702.2.5 Exhaust systems. Standby power shall be provided for common exhaust systems for domestic kitchens located in multistory structures as required in Section 505.5 of the *International Mechanical Code.* Standby power shall be provided for common exhaust systems for clothes dryers located in multistory structures as required in Section 504.10 of the *International Mechanical Code* and Section 614.10 of the *International Fuel Gas Code*.

[F] 2702.2.6 Exit signs. Emergency power shall be provided for exit signs as required in Section 1013.6.3. The system shall be capable of powering the required load for a duration of not less than 90 minutes.

[F] 2702.2.7 Gas detection system. Emergency or standby power shall be provided for gas detection systems in accordance with the *International Fire Code*.

[F] 2702.2.8 Group I-2 occupancies. Essential electrical systems for Group I-2 occupancies shall be in accordance with Section 407.11.

[F] 2702.2.9 Group I-3 occupancies. Emergency power shall be provided for power-operated doors and locks in Group I-3 occupancies as required in Section 408.4.2.

[S][F] 2702.2.10 Hazardous materials. Emergency or legally required standby power shall be provided in occupancies with hazardous materials where required by the *International Fire Code*.

[S][F] 2702.2.11 High-rise buildings. Emergency ((~~and standby~~)) power shall be provided in high-rise buildings as required in Section 403.4.8.

[F] 2702.2.12 Laboratory suites. Standby or emergency power shall be provided in accordance with Section 5004.7 of the *International Fire Code* where *laboratory suites* are located above the sixth story above grade plane or located in a story below grade plane.

[F] 2702.2.13 Means of egress illumination. Emergency power shall be provided for means of egress illumination as required in Section 1008.3. The system shall be capable of powering the required load for a duration of not less than 90 minutes.

[S][F] 2702.2.14 Membrane structures. ((~~Standby~~)) Legally required standby power shall be provided for auxiliary inflation systems in permanent membrane structures as required in Section 3102.8.2. ((~~Standby~~)) Legally required standby power shall be provided for a duration of not less than 4 hours. Auxiliary inflation systems in temporary air-supported and air-inflated membrane structures shall be provided in accordance with Section 3103.10.4 of the *International Fire Code.*

[F] 2702.2.15 Semiconductor fabrication facilities. Emergency power shall be provided for semiconductor fabrication facilities as required in Section 415.11.10.

[S][F] 2702.2.16 Smoke control systems. ((~~Standby~~)) Emergency power shall be provided for smoke control systems as required in Sections 404.7, 909.11, 909.20.5.7, 909.20.6.2 and 909.21.5. *Legally required standby power systems* shall be provided for pressurization systems in low-rise buildings in accordance with Sections 909.20.6 and 909.21.5.

[S][F] 2702.2.17 Special purpose horizontal sliding, accordion or folding doors. ((~~Standby~~)) Legally required standby power shall be provided for special purpose horizontal sliding, accordion or folding doors as required in Section 1010.1.4.3. The standby power supply shall have a capacity to operate not fewer than 50 closing cycles of the door.

[S][F] 2702.2.18 Underground buildings. Emergency ((~~and standby~~)) power shall be provided in underground buildings as required in Section 405.

[F] 2702.3 Critical circuits. Required critical circuits shall be protected using one of the following methods:

1. Cables, used for survivability of required critical circuits, that are listed in accordance with UL 2196 and have a fire-resistance rating of not less than 1 hour.
2. Electrical circuit protective systems having a fire-resistance rating of not less than 1 hour. Electrical circuit protective systems are installed in accordance with their listing requirements.
3. Construction having a fire-resistance rating of not less than 1 hour.

[F] 2702.4 Maintenance. Emergency and standby power systems shall be maintained and tested in accordance with the *International Fire Code*.

CHAPTER 29

PLUMBING SYSTEMS

User note:

About this chapter: *Plumbing systems are another key element of any building. Chapter 29 provides the necessary number of plumbing fixtures, including water closets, lavatories, bathtubs and showers. The quality and design of each fixture must be in accordance with the* International Plumbing Code®.

SECTION 2901
GENERAL

[S][P] 2901.1 Scope. The provisions of this chapter and the ((~~*International*~~)) *Uniform Plumbing Code* shall govern the design, construction, erection and installation of plumbing components, appliances, equipment and systems used in *buildings* and structures covered by this code. Toilet and bathing rooms shall be constructed in accordance with Section 1209. ((~~Private sewage disposal systems shall conform to the *International Private Sewage Disposal Code.*~~)) The *International Fire Code*, the *International Property Maintenance Code* and the ((~~*International*~~)) *Uniform Plumbing Code* shall govern the use and maintenance of plumbing components, appliances, equipment and systems. The *International Existing Building Code* and the ((~~*International*~~)) *Uniform Plumbing Code* shall govern the *alteration, repair*, relocation, replacement and *addition* of plumbing components, *appliances, equipment* and systems.

Note: The Director of Public Health—Seattle and King County is authorized to enforce this chapter.

[S] 2901.2 Health codes. In food preparation, serving and related storage areas, additional fixture requirements may be dictated by state and local health codes.

[W] 2901.3 Fixed guideway transit and passenger rail systems. In construction of a fixed guideway and passenger rail system, subject to Section 3114, public plumbing fixtures are not required.

SECTION 2902
MINIMUM PLUMBING FACILITIES

[S][P] 2902.1 Minimum number of fixtures. Plumbing fixtures shall be provided in the minimum number as shown in Table 2902.1 based on the actual use of the building or space. Uses not shown in Table 2902.1 shall be ((~~considered~~)) determined individually by the ((~~code~~)) *building official* based on the classification and description which most nearly resemble the proposed use. The number of occupants shall be determined by this code.

Exception: Plumbing fixtures need not be provided for the following:

1. Buildings or facilities that are not normally occupied.
2. Storage, mechanical, electrical, and other similar spaces that are not normally occupied and are ancillary to the main occupancy of the building.
3. Building entry lobbies accessory to and used only for circulation in Group B office and Group R-2 residential occupancies.

[S][P] TABLE 2902.1
MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES[a]
(See Sections 2902.1.1 and 2902.2)

No.	CLASSIFICATION	DESCRIPTION	WATER CLOSETS (((~~URINALS SEE SECTION 424.2 OF THE *INTERNATIONAL PLUMBING CODE*~~)))		LAVATORIES		BATHTUBS/ SHOWERS	((~~DRINKING FOUNTAINS (SEE SECTION 410 OF THE *INTERNATIONAL PLUMBING CODE*)~~	~~OTHER~~))
			Male	Female	Male	Female			
1	Assembly	Theaters and other buildings for the performing arts and motion pictures[d]	1 per 125	1 per 65	1 per 200		—	((~~1 per 500~~	~~1 service sink~~
		Nightclubs, bars, taverns, dance halls and buildings for similar purposes[d]	1 per 40	1 per 40	1 per 75		—	((~~1 per 500~~	~~1 service sink~~
		Restaurants, banquet halls and food courts[d]	1 per 75	1 per 75	1 per 200		—	((~~1 per 500~~	~~1 service sink~~
		Casino gaming areas	1 per 100 for the first 400 and 1 per 250 for the remainder exceeding 400	1 per 50 for the first 400 and 1 per 150 for the remainder exceeding 400	1 per 250 for the first 750 and 1 per 500 for the remainder exceeding 750		—	((~~1 per 1,000~~	~~1 service sink~~
		Auditoriums without permanent seating, art galleries, exhibition halls, museums, lecture halls, libraries, arcades and gymnasiums[d]	1 per 125	1 per 65	1 per 200		—	((~~1 per 500~~	~~1 service sink~~
		Passenger terminals and transportation facilities[d]	1 per 500	1 per 500	1 per 750		—	((~~1 per 1,000~~	~~1 service sink~~
		Places of worship and other religious services[d]	1 per 150	1 per 75	1 per 200		—	((~~1 per 1,000~~	~~1 service sink~~
		Coliseums, arenas, skating rinks, pools and tennis courts for indoor sporting events and activities	1 per 75 for the first 1,500 and 1 per 120 for the remainder exceeding 1,500	1 per 40 for the first 1,520 and 1 per 60 for the remainder exceeding 1,520	1 per 200	1 per 150	—	((~~1 per 1,000~~	~~1 service sink~~
		Stadiums, amusement parks, bleachers and grandstands for outdoor sporting events and activities[f]	1 per 75 for the first 1,500 and 1 per 120 for the remainder exceeding 1,500	1 per 40 for the first 1,520 and 1 per 60 for the remainder exceeding 1,520	1 per 200	1 per 150	—	((~~1 per 1,000~~	~~1 service sink~~

[S][P] TABLE 2902.1—continued
MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES[a]
(See Sections 2902.1.1 and 2902.2)

No.	CLASSIFICATION	DESCRIPTION	WATER CLOSETS (((~~URINALS SEE SECTION 424.2 OF THE INTERNATIONAL PLUMBING CODE~~)))		LAVATORIES		BATHTUBS/ SHOWERS	((~~DRINKING FOUNTAINS (SEE SECTION 410 OF THE INTERNATIONAL PLUMBING CODE)~~	~~OTHER~~))
			Male	Female	Male	Female			
2	Business	Buildings for the transaction of business, professional services, other services involving merchandise, office buildings, banks, light industrial, ambulatory care and similar uses	1 per 25 for the first 50 and 1 per 50 for the remainder exceeding 50		1 per 40 for the first 80 and 1 per 80 for the remainder exceeding 80		—	((~~1 per 100~~	~~1 service sink[e]~~))
3	Educational	Educational facilities	1 per ((~~50~~)) 35		1 per 85	1 per 50	—	((~~1 per 100~~	~~1 service sink~~))
4	Factory and industrial	Structures in which occupants are engaged in work fabricating, assembly or processing of products or materials	1 per 100		1 per 100		((—)) See footnote g	((~~1 per 400~~	~~1 service sink~~))
5	Institutional	Custodial care facilities	1 per 10		1 per 10		1 per 8	((~~1 per 100~~	~~1 service sink~~))
		Medical care recipients in hospitals and nursing homes[b]	1 per room[c]		1 per room[c]		1 per 15	((~~1 per 100~~	~~1 service sink~~))
		Employees in hospitals and nursing homes[b]	1 per 25		1 per 35		—	((~~1 per 100~~	~~—~~))
		Visitors in hospitals and nursing homes	1 per 75		1 per 100		—	((~~1 per 500~~	~~—~~))
		Prisons[b]	1 per cell		1 per cell		1 per 15	((~~1 per 100~~	~~1 service sink~~))
		Reformatories, detention centers and correctional centers[b]	1 per 15		1 per 15		1 per 15	((~~1 per 100~~	~~1 service sink~~))
		Employees in reformitories, detention centers and correctional centers[b]	1 per 25		1 per 35		—	((~~1 per 100~~	~~—~~))
		Adult day care and child day care	1 per 15		1 per 15		1	((~~1 per 100~~	~~1 service sink~~))

[S][P] TABLE 2902.1—continued
MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES[a]
(See Sections 2902.1.1 and 2902.2)

No.	CLASSIFICATION	DESCRIPTION	WATER CLOSETS (((~~URINALS SEE SECTION 424.2 OF THE *INTERNATIONAL PLUMBING CODE*~~)))		LAVATORIES		BATHTUBS/ SHOWERS	((~~DRINKING FOUNTAINS (SEE SECTION 410 OF THE *INTERNATIONAL PLUMBING CODE*)~~	~~OTHER~~))
			Male	Female	Male	Female			
6	Mercantile	Retail stores, service stations, shops, salesrooms, markets and shopping centers	1 per 500		1 per 750		—	((~~1 per 1,000~~	~~1 service sink[e]~~))
7	Residential	Hotels, motels, boarding houses (transient)	1 per sleeping unit		1 per sleeping unit		1 per sleeping unit	((—	~~1 service sink~~))
		Dormitories, fraternities, sororities and boarding houses (not transient)	1 per 10		1 per 10		1 per 8	((~~1 per 100~~	~~1 service sink~~))
		Apartment house	1 per dwelling unit		1 per dwelling unit		1 per dwelling unit	((—	~~1 kitchen sink per dwelling unit; 1 automatic clothes washer connection per 20 dwelling units~~))
		One- and two-family dwellings and lodging houses with five or fewer guestrooms	1 per dwelling unit		1 per 10		1 per dwelling unit	((—	~~1 kitchen sink per dwelling unit; 1 automatic clothes washer connection per dwelling unit~~))
		Congregate living facilities with 16 or fewer persons	1 per 10		1 per 10		1 per 8	((~~1 per 100~~	~~1 service sink~~))
8	Storage	Structures for the storage of goods, warehouses, storehouses and freight depots, low and moderate hazard	1 per 100		1 per 100		((—)) See footnote g	((~~1 per 1,000~~	~~1 service sink~~))

a. The fixtures shown are based on one fixture being the minimum required for the number of persons indicated or any fraction of the number of persons indicated. The number of occupants shall be determined by this code, except with respect to Group E occupancies the provisions of note "e" shall apply.
b. Toilet facilities for employees shall be separate from facilities for inmates or care recipients.
c. A single-occupant toilet room with one water closet and one lavatory serving not more than two adjacent patient sleeping units shall be permitted, provided that each patient sleeping unit has direct access to the toilet room and provisions for privacy for the toilet room user are provided.
d. The occupant load for seasonal outdoor seating and entertainment areas shall be included when determining the minimum number of facilities required.
e. ((~~For business and mercantile classifications with an occupant load of 15 or fewer, a service sink shall not be required.~~)) For Group E occupancies the number of occupants shall be determined by using a calculation of 100 square feet gross building area per student for the minimum number of plumbing fixtures.
f. The required number and type of plumbing fixtures for outdoor swimming pools shall be in accordance with Section 609 of the *International Swimming Pool and Spa Code*.
g. See *Uniform Plumbing Code* Section 416.0 for installation requirements for emergency shower and eyewash equipment.

[P] 2902.1.1 Fixture calculations. To determine the *occupant load* of each sex, the total *occupant load* shall be divided in half. To determine the required number of fixtures, the fixture ratio or ratios for each fixture type shall be applied to the *occupant load* of each sex in accordance with Table 2902.1. Fractional numbers resulting from applying the fixture ratios of Table

2902.1 shall be rounded up to the next whole number. For calculations involving multiple occupancies, such fractional numbers for each occupancy shall first be summed and then rounded up to the next whole number.

Exception: The total *occupant load* shall not be required to be divided in half where *approved* statistical data indicate a distribution of the sexes of other than 50 percent of each sex.

[S] 2902.1.1.1 Private offices. Fixtures only accessible to private offices shall not be counted to determine compliance with this section.

[W] 2902.1.1.2 Urinals in men's facilities. Where urinals are provided in men's facilities, one water closet less than the number specified may be provided for each urinal installed, except the number of water closets in such cases shall not be reduced to less than 25 percent of the minimum specified. For men's facilities serving 26 or more persons, not less than one urinal shall be provided.

[W][S] 2902.1.1.3 Urinals in gender neutral facilities. Where urinals are provided in gender-neutral facilities, one water closet less than the number specified may be provided for each urinal installed, except the number of water closets in such cases shall not be reduced to less than 25 percent of the minimum specified. For facilities serving 26 or more persons, not less than one urinal shall be provided.

[P] 2902.1.2 Single-user toilet facility and bathing room fixtures. The plumbing fixtures located in single-user toilet facilities and bathing rooms, including family or assisted-use toilet and bathing rooms that are required by Section 1109.2, shall contribute toward the total number of required plumbing fixtures for a building or tenant space. Single-user toilet facilities and bathing rooms, and family or assisted-use toilet rooms and bathing rooms shall be identified for use by either sex.

[P] 2902.1.3 Lavatory distribution. Where two or more toilet rooms are provided for each sex, the required number of lavatories shall be distributed proportionately to the required number of water closets.

[W] 2902.1.4 Family or assisted-use toilet and bath fixtures. Fixtures located within family or assisted-use toilet and bathing rooms required by Section 1109.2.1 are permitted to be included in the number of required fixtures for either the male or female occupants in assembly and mercantile occupancies.

[W][S][P] 2902.2 Separate facilities. Where plumbing fixtures are required, separate facilities shall be provided for each sex.

Exceptions:

1. Separate facilities shall not be required for *dwelling units* and *sleeping units*.
2. Separate facilities shall not be required in structures or tenant spaces with a total *occupant load*, including both employees and customers, of 15 or fewer.
3. Separate facilities shall not be required in mercantile occupancies in which the maximum occupant load is 100 or fewer.
4. Separate facilities shall not be required in business occupancies in which the maximum occupant load is ((~~25~~)) 30 or fewer.
5. Single-occupant restrooms shall not be restricted to a specific sex or gender identity and shall use appropriate signage to indicate such facilities are designated for use by any person, regardless of sex or gender identity. See SMC 14.07.
6. Separate facilities shall not be required when gender-neutral facilities are provided in accordance with Section 2902.2.2.

[P] 2902.2.1 Family or assisted-use toilet facilities serving as separate facilities. Where a building or tenant space requires a separate toilet facility for each sex and each toilet facility is required to have only one water closet, two family or assisted-use toilet facilities shall be permitted to serve as the required separate facilities. Family or assisted-use toilet facilities shall not be required to be identified for exclusive use by either sex as required by Section 2902.4.

[W] 2902.2.2 Gender-neutral facilities. Gender-neutral toilet facilities, when provided, shall be in accordance with the following:

1. There is no reduction in the number of fixtures required to be provided for male and female in the type of occupancy and in the minimum number shown in Table 2902.1.
2. Gender-neutral multiuser toilet rooms shall have water closets and urinals located in toilet compartments in accordance with ICC A117.1.
3. Gender-neutral multiuser toilet room water closet and urinal compartments shall have full-height walls and a door enclosing the fixture to ensure privacy.
4. Gender-neutral toilet room water closet and urinal compartment doors shall be securable from within the compartment.
5. Gender-neutral toilet rooms provided for the use of multiple occupants, the egress door from the room shall not be lockable from the inside of the room.
6. Compartments shall not be required in a single-occupant toilet room with a lockable door.

[P] 2902.3 Employee and public toilet facilities. For structures and tenant spaces intended for public utilization, customers, patrons and visitors shall be provided with public toilet facilities. Employees associated with structures and tenant spaces shall be provided with toilet facilities. The number of plumbing fixtures located within the required toilet facilities shall be provided

in accordance with Section 2902 for all users. Employee toilet facilities shall be either separate or combined employee and public toilet facilities.

Exception: Public toilet facilities shall not be required for:

1. Parking garages where operated without parking attendants.
2. Structures and tenant spaces intended for quick transactions, including takeout, pickup and drop-off, having a public access area less than or equal to 300 square feet (28 m^2).

[S][P] 2902.3.1 Access. The route to the public toilet facilities required by Section 2902.3 shall not pass through kitchens, food preparation areas, unpackaged food storage areas, storage rooms or closets. Access to the required facilities shall be from within the building or from the exterior of the building. Access to toilets serving multiple tenants shall be through a common use area and not through an area controlled by a tenant. Routes shall comply with the accessibility requirements of this code. The public shall have access to the required toilet facilities at all times that the building is occupied. For other requirements for plumbing facilities, see Chapter 11.

[P] 2902.3.2 Prohibited toilet room location. Toilet rooms shall not open directly into a room used for the preparation of food for service to the public.

[S][P] 2902.3.3 Location of toilet facilities in occupancies other than malls. In occupancies other than covered and open mall buildings, the required public and employee toilet facilities shall be located in each building not more than one *story* above or below the space required to be provided with toilet facilities, or conveniently in a building adjacent thereto on the same property, and the path of travel to such facilities shall not exceed a distance of 500 feet (152 m).

Exception: The location and maximum distances of travel to required employee facilities in factory and industrial occupancies are permitted to exceed that required by this section, provided that the location and maximum distance of travel are *approved*.

[P] 2902.3.4 Location of toilet facilities in malls. In covered and open mall buildings, the required public and employee toilet facilities shall be located not more than one story above or below the space required to be provided with toilet facilities, and the path of travel to such facilities shall not exceed a distance of 300 feet (91 ((~~mm~~)) m). In mall buildings, the required facilities shall be based on total square footage (m^2) within a covered mall building or within the perimeter line of an open mall building, and facilities shall be installed in each individual store or in a central toilet area located in accordance with this section. The maximum distance of travel to central toilet facilities in mall buildings shall be measured from the main entrance of any store or tenant space. In mall buildings, where employees' toilet facilities are not provided in the individual store, the maximum distance of travel shall be measured from the employees' work area of the store or tenant space.

[P] 2902.3.5 Pay facilities. Where pay facilities are installed, such facilities shall be in excess of the required minimum facilities. Required facilities shall be free of charge.

[P] 2902.3.6 Door locking. Where a toilet room is provided for the use of multiple occupants, the egress door for the room shall not be lockable from the inside of the room. This section does not apply to family or assisted-use toilet rooms.

[W][P] 2902.4 Signage. Required public facilities shall be provided with signs that designate the sex as ((~~required by Section 2902.2~~)) for separate facilities or indicate gender-neutral facilities. Signs shall be readily visible and located near the entrance to each toilet facility. Signs for accessible toilet facilities shall comply with Section 1111.

[P] 2902.4.1 Directional signage. Directional signage indicating the route to the required public toilet facilities shall be posted in a lobby, corridor, aisle or similar space, such that the sign can be readily seen from the main entrance to the building or tenant space.

[S][P] 2902.5 Drinking fountain location. Drinking fountains shall not be required to be located in individual tenant spaces provided that public drinking fountains are located within a distance of travel of 500 feet (152 m) of the most remote location in the tenant space and not more than one story above or below the tenant space. Where the tenant space is in a covered or open mall, such distance shall not exceed 300 feet (91 440 mm). Drinking fountains shall be located on an accessible route. Drinking fountains shall not be located in toilet rooms.

[S] 2902.5.1 Drinking fountain number. Occupant loads over 30 shall have one drinking fountain for the first 150 occupants, then one per each additional 500 occupants.

Exceptions:

1. Sporting facilities with concessions serving drinks shall have one drinking fountain for each 1,000 occupants.
2. A drinking fountain need not be provided in a drinking or dining establishment.

[S] 2902.5.2 Multistory buildings. Drinking fountains shall be provided on each floor having more than 30 occupants in schools, dormitories, auditoriums, theaters, offices and public buildings.

[S] 2902.5.3 Penal institutions. Penal institutions shall have one drinking fountain on each cell block floor and one on each exercise floor.

[S] 2902.5.4 Bottle filling stations. *Bottle filling stations* shall be provided in accordance with Sections 2902.5.4.1 through 2902.5.4.3.

2902.5.4.1 Group E occupancies. In Group E occupancies with an occupant load over 30, a minimum of one *bottle filling station* shall be provided on each floor. This *bottle filling station* may be integral to a drinking fountain.

2902.5.4.2 Substitution. In all occupancies that require more than two drinking fountains per floor or secured area, *bottle filling stations* shall be permitted to be substituted for up to 50 percent of the required number of drinking fountains.

2902.5.4.3 Accessibility. At least one of the required *bottle filling stations* shall be located in accordance with Section 309 of ICC A117.1.

[S] 2902.6 Dwelling units. Dwelling units shall be provided with a kitchen sink.

[S] 2902.7 Water closet space requirements. The water closet stool in all occupancies shall be located in a clear space not less than 30 inches (762 mm) in width, with a clear space in front of the stool of not less than 24 inches (610 mm).

[S] 2902.8 Water. Each required sink, lavatory, bathtub and shower stall shall be equipped with hot and cold running water necessary for its normal operation.

[P] ((~~2902.6~~)) 2902.9 Small occupancies. Drinking fountains shall not be required for an occupant load of 15 or fewer.

CHAPTER 30

ELEVATORS AND CONVEYING SYSTEMS

Note: Chapter 30 is comprised entirely of Seattle amendments to the *International Building Code* and is not underlined.

SECTION 3001
PURPOSE

The purpose of this chapter is to protect persons, buildings and the contents thereof from hazards arising from the use of elevators, dumbwaiters, material lifts, escalators, moving walks and other conveyances by establishing minimum requirements regulating the design, construction, alteration, operation, testing and maintenance of elevators, dumbwaiters, material lifts, escalators, moving walks and other conveyances, and by establishing procedures by which these requirements may be enforced.

SECTION 3002
SCOPE

3002.1 General. This code of safety standards covers the design, construction, installation, operation, inspection testing, maintenance, alteration and repair of elevators, dumbwaiters, material lifts, escalators, moving walks and other conveyances.

3002.2 Application to existing conveyances.

3002.2.1 Minimum standard for existing conveyances. All existing conveyances shall comply with Section 3011 as minimum standards.

3002.2.2 Maintenance. All conveyances covered under this chapter, both existing and new, and all parts thereof shall be maintained in a safe condition. All devices and safeguards that are required by this chapter shall be maintained in good working order. All devices or safeguards that were required by a code in effect when the conveyance was installed, altered, or repaired shall be maintained in good working order. Maintenance shall comply with ASME A17.1/CSA B44 Section 8.6. The owner or the owner's designated agent is responsible for the maintenance of such equipment.

3002.2.3 Repairs and replacements. Repairs to existing conveyances and replacements of devices and components shall be made with parts of at least equivalent material, strength and design. They shall comply with Section 3011 of this code and ASME A17.1/CSA B44 Section 8.6. The owner or the owner's designated agent is responsible for the repair and replacement of such equipment.

3002.2.4 Additions and alterations. Additions and alterations are permitted to be made to the conveyance system of *existing buildings* or structures without making the entire system comply with all of the requirements of this chapter for new buildings or structures, provided the additions and alterations that are made comply with the requirements of this chapter for a new system, except as otherwise specifically provided in this code and in other applicable retroactive ordinances of the city.

Unless otherwise *approved* by the *building official*, alterations, repairs, replacements, testing and maintenance of conveyances shall comply with the requirements of ASME A17.1/CSA B44 Section 8.7. Where Section 8.7 refers to a requirement that has been amended by this chapter, the requirements of this chapter take precedence. Alterations to existing material lifts shall conform with the requirements of WAC Chapter 296-96 Part C1 Standard Application Material Lifts or ASME A17.1/CSA B44, 7.4, or 7.5, or 7.6, where applicable. The owner or the owner's designated agent is responsible for additions and alterations of such equipment.

3002.2.5 Seismic improvements. The *building official* is authorized to promulgate rules to establish standards for seismic improvements to existing conveyances.

3002.2.6 Change of use. A change in use of an elevator from freight to passenger, passenger to freight, or from one freight class to another freight class shall comply with Section 3011 of this code and Sections 8.7 and 2.16.4 of ASME A17.1/CSA B44 for passenger elevators.

3002.2.7 Landmark buildings and structures. See the *International Existing Building Code* for regulations regarding *landmark buildings* or structures.

3002.3 References to the *National Electrical Code.* For the purpose of this chapter, all references in the ASME Code to the *National Electrical Code* include the *Seattle Electrical Code.* All electrical work shall be done in accordance with the requirements of the *Seattle Electrical Code.*

3002.4 Conflicts. In any case where the codes adopted by reference in Section 3003 conflict with the requirements of this chapter, this chapter controls.

SECTION 3003
CODES

3003.1 Seattle Elevator Code. The following are adopted by reference as part of the *Seattle Building Code*. They also constitute the *Elevator Code* of the City of Seattle.

1. Safety Code for Elevators and Escalators, ASME A17.1/CSA B44-2019, as amended in this ordinance and Appendices A through D, F through J, L, M and P through V.

   Exceptions:

   1.1. ASME A17.1 Sections 5.8, 5.9, 5.10, 5.11, and 5.12 are not adopted.

   1.2. ASME A17.1 Section 1.2.1, Purpose, is not adopted.

2. Safety Standard for Platform Lifts and Stairway Chairlifts, ASME A18.1-2017.
3. Standard for Elevator Suspension, Compensation, and Governor Systems, ASME A17.6-2017.

   Exception: ASME A17.6 Part 2 Aramid Fiber Ropes for Elevators, is not adopted.

4. Washington Administrative Code Chapter 296-96 Part C1 Minimum Standards for New and Altered Standard Application Material Lifts.

3003.2 Licensing. All persons and firms working on conveyances in Seattle shall comply with chapter 70.87 RCW and chapter 296-96 WAC.

3003.3 Administrative rules. The *building official* is authorized to adopt by administrative rule, in accordance with Section 104.8, that furthers the intent and purpose of this code, that encourages the use of state of the art technology, materials or methods of construction, and which provides standards that are equal or better than those contained in this code.

SECTION 3004
DEFINITIONS

The following words and terms shall, for the purposes of this section and as used elsewhere in this code, have the meanings shown herein. These definitions are in addition to ASME A17.1/CSA B44 Section 1.3, RCW 70.87, Laws Governing Elevators and Other Lifting Devices, and Chapter 2 of this code.

ALTERATIONS, REPAIRS AND REPLACEMENTS. See ASME A17.1 Section 1.3.

AUTOMATIC ELEVATOR. A type of elevator that does not require an attendant. All calls are registered by the passengers.

CONTROL ROOM. An enclosed control space outside the hoistway, intended for full bodily entry, that contains the motor controller. The room could also contain electrical or mechanical equipment used directly in connection with the elevator, dumbwaiter, or material lift but not the electric driving machine or the hydraulic machine.

CONTROL SPACE. A space outside the hoistway, intended to be accessed with or without full bodily entry, that contains the motor controller. This space could also contain electrical or mechanical equipment used directly in connection with the elevator, dumbwaiter, or material lift but not the electric driving machine or the hydraulic machine.

CONVEYANCE. An elevator, accessibility lift, escalator, dumbwaiter, material lift, moving walk or other elevating device.

CONVEYANCES IN SERVICE. Units that are in operation, are inspected and certified by the *building official* for operation.

CONVEYANCES OUT OF SERVICE. The use of the unit has been prohibited either temporarily or permanently in accordance with Section 3005 below.

ELEVATOR GROUP. A grouping of elevators in a building located adjacent or directly across from one another that responds to common hall call buttons.

ENFORCING AUTHORITY. As used in ASME A17.1 means the *building official.*

EXISTING INSTALLATIONS. All conveyances that have been tested and approved for use by the *building official.*

INSPECTOR. Inspectors employed by the City of Seattle and working under the direction of the *building official.*

MACHINE ROOM. An enclosed machinery space outside the hoistway, intended for full bodily entry, that contains the electric driving machine or the hydraulic machine. The room could also contain the motor controller, and electrical and/or mechanical equipment used directly in connection with the elevator, dumbwaiter, or material lift.

MACHINERY SPACE. A space inside or outside the hoistway, intended to be accessed with or without full bodily entry, that contains elevator, dumbwaiter, or material lift mechanical equipment, and could also contain electrical equipment used directly in connection with the elevator, dumbwaiter, or material lift. This space could also contain the electric driving machine or the hydraulic machine.

MATERIAL LIFT. A fixed, stationary conveyance that:

1. Has a car or platform that moves in guides;
2. Serves two or more floors or landings of a building or structure;
3. Has a vertical rise of at least 30 inches (762 mm) and no more than 60 feet (18 288 mm);
4. Has a maximum speed of 50 feet (15 240 mm) per minute;
5. Is an isolated, self-contained lift and is not a part of a conveying system;
6. Travels in an inclined or vertical, but not horizontal, direction;
7. Is operated only by, or under the direct supervision of, an individual designated by the employer; and
8. Is installed in a commercial or industrial area, and not in an area that is open to access by the general public.

SECTION 3005
AUTHORITY TO DISCONNECT UTILITIES, TAKE CONVEYANCES OUT OF SERVICE AND INVESTIGATE ACCIDENTS

3005.1 Disconnection of utilities. In addition to the provisions for Emergency Orders provided in Section 102, the *building official* is authorized to disconnect or order discontinuance of any utility service or energy supply to equipment regulated by this code in cases of emergency or where necessary for safety to life and property. Such utility service shall be discontinued until the equipment, appliances, devices or wiring found to be defective or defectively installed are replaced, repaired, or restored to a safe condition. Proper posting and seals shall be affixed to the equipment to prevent inadvertent use.

3005.2 Conveyances out of service. A conveyance shall be taken out of service temporarily after the *building official* has inspected the unit for proper parking of the car, securing the hoistway openings, and disconnection of power. A seal and tag shall be placed on the equipment to insure against unauthorized use. A conveyance is permitted to remain in a temporarily out-of-service status for a period not to exceed two years, after which time it shall be placed in a permanently out-of-service status.

Exception: Elevators that could be returned to service without repair are permitted to remain in a temporary out-of-service status with approval of the *building official.*

A conveyance shall be placed permanently out of service by landing the car and counterweights and removing the hoisting cables or fluid lines. Conveyances placed in a permanently out-of-service status shall have the hoistway sealed off for fire protection by securing existing doors.

Conveyances in an out-of-service status either temporarily or permanently are permitted to be placed back into service and classified as an existing installation unless determined to be hazardous by the *building official.* Requirements in effect at that time must be completed before certification and use. No installation or reconnection of hydraulic elevators powered by city water pressure is permitted.

3005.3 Report and investigation of accidents. The owner or the owner's authorized agent shall promptly notify the *building official* of each accident involving a conveyance that requires the service of a physician or results in a disability exceeding one day, and shall afford the *building official* every facility for investigating and inspecting the accident. The *building official* shall without delay, after being notified, make an inspection and shall place on file a full and complete report of the accident. The report shall give in detail all material facts and information available and the cause or causes, so far as they can be determined. The report shall be open to public inspection at all reasonable hours. If an accident involves the failure or destruction of any part of the construction or the operating mechanism of a conveyance, the use of the conveyance is forbidden until it has been made safe, it has been reinspected and any repairs, changes, or alterations have been *approved* by the department, and a permit has been issued by the *building official.* The removal of any part of the damaged construction or operating mechanism from the premises is forbidden until the *building official* grants permission to do so.

SECTION 3006
INSTALLATION AND ALTERATION PERMITS

3006.1 Installation permits. A permit issued by the *building official* is required to install any elevator, escalator, dumbwaiter, automobile parking elevator, material lift moving walk, accessibility lifts or other conveyance. A separate permit shall be obtained for each conveyance installed regardless of location and/or contract arrangements.

3006.2 Alteration/repair permits. A permit is required to make any alterations to existing elevators, escalators, dumbwaiters, automobile parking elevators, material lifts, moving walks or other conveyances. A separate permit shall be obtained for each conveyance altered or relocated regardless of location and/or contract arrangements.

Exceptions:

1. Permits for repairs required by inspection reports are permitted to be combined for a single building.

2. The *building official* is permitted to issue a single permit for minor alterations to more than one conveyance that do not require individual retesting of each conveyance.
3. No permit shall be required for ordinary repairs made with parts of the same materials, strength and design normally necessary for maintenance.

3006.3 Temporary use permits. The *building official* is permitted to issue a temporary use permit for a period not to exceed 60 days to allow completion of installation and passing of the final inspection. Temporary use permits may be renewed by the *building official.* If, at any time during the period of temporary use, the *building official* determines that the building owner is not making adequate progress toward completion of the installation and passing of the final inspection, the *building official* is permitted to withdraw the temporary use permit on seven days' notice. The *building official* is authorized to forbid further use of the conveyance until a certificate of inspection is obtained. If any conveyance is found to be *unsafe* or fails to comply with a notice of correction, the *building official* is authorized to revoke the temporary use permit.

3006.4 Expiration, renewal and revocation of permits. Sections 106.9 through 106.12 apply to permits required by this chapter.

SECTION 3007
PLANS AND SPECIFICATIONS

3007.1 Permit drawings. Two sets of drawings, which are permitted to be in an electronic format, shall be submitted with applications as determined by the *building official* for installations of new elevators, escalators, dumbwaiters, material lifts, moving walks and other conveyances.

The drawings shall show beams, attachments, loads and reactions, and shall bear the seal of a structural engineer licensed under the laws of Washington State.

The *structural engineer in responsible charge* for the building shall review the drawings and forward them to the *building official* with a notation indicating that the drawings have been reviewed and been found to be in general conformance to the design of the building.

Exception: An engineer's stamp is not required for hydraulic elevators.

3007.2 Amendments to the permit. If changes to the *approved* work are made during construction, approval of the *building official* shall be obtained prior to execution. The inspector may approve minor changes for work that will not reduce the structural strength or fire and life safety of the structure. The inspector shall determine if it is necessary to revise the *approved construction documents.* No changes that are subject to special inspection required by Chapter 17 shall be made during construction unless approved by the *building official.* If revised plans are required, changes shall be shown on two sets of plans, permitted to be in electronic format, that shall be submitted to and approved by the *building official,* accompanied by fees specified in the *Fee Subtitle* prior to occupancy. All changes shall conform to the requirements of this code and other pertinent laws and ordinances and other issued permits.

SECTION 3008
REQUIRED INSTALLATION INSPECTIONS

3008.1 Installation inspections. It is the duty of the person doing the work authorized by a permit to notify the *building official* that such work is ready for inspection.

It is the duty of the person requesting any inspections required by this chapter to provide access to and means for proper inspection of such work.

Final inspection shall be called for by the applicant when the work described on the permit has been completed, and when ready for testing with weights and instruments, as needed. A final inspection is required after all wiring has been completed and all permanent fixtures such as switches, outlet receptacles, plates, lighting fixtures and all other equipment has been properly installed, and the hoistway, control rooms, spaces are properly completed.

SECTION 3009
CERTIFICATES OF INSPECTION AND OPERATION

3009.1 Certificates required. It is a violation of this code to operate any elevator, escalator, dumbwaiter, material lift, moving walk or other conveyance without a certificate of inspection or authorization of temporary use issued by the *building official.* A certificate of inspection shall be issued following an inspection by the *building official* showing that the conveyance has been found to be in safe operating condition and applicable fees for inspection time, as set forth in the *Fee Subtitle,* have been paid. The certificate is valid until 45 days after the next inspection or until the certificate is withdrawn, whichever comes first.

The certificate of inspection shall be posted in the machine room, control room or management office.

If any conveyance is found to be *unsafe* or fails to comply with a notice of correction, the *building official* is authorized to withdraw the certificate of inspection.

3009.2 Periodic inspections. The *building official* shall cause inspections to be made of every conveyance at intervals of 12 months or as soon thereafter as is practical. The inspector shall file a full and correct report on each conveyance with the *building official* that shall note any code violations, corrections required and the general condition of the conveyance.

3009.3 Inspection report by building official. After each required inspection of a conveyance the *building official* shall mail a copy of the inspection report to the owner of the conveyance inspected. If inspection shows a conveyance to be in violation of the requirements of this chapter, the *building official* shall issue a notice in writing listing the corrections to be made to the conveyance that are necessary to bring it into compliance with this chapter and is authorized to order the operation thereof discontinued until the corrections are made.

The owner upon receipt of inspection report shall complete all corrections within 90 days. The owner or owner's authorized agent shall notify the *building official* in writing when deficiencies are corrected.

3009.4 Inspections, tests, and test reports. Reports of required tests shall be submitted to the owner and to the *building official* on forms furnished by the *building official*. Reports shall be submitted to the *building official* in writing within 60 days of completion of tests. Performance of required tests and their cost shall be the responsibility of the owner. Identification of conveyances shall be noted by use of assigned city numbers.

SECTION 3010
REQUIREMENTS FOR OPERATION AND MAINTENANCE

3010.1 Responsibility for operation and maintenance. The owner or the owner's designated agent is responsible for the safe operation and maintenance of each device regulated by this chapter. The installation of pipes, ducts, conduits, wiring and the storage of materials not required for the operation of the elevator is prohibited in hoistways, control rooms, machine rooms and machine spaces. Sidewalk elevators in public places are also subject to the requirements of Title 15, Seattle Municipal Code, Street and Sidewalk Use, as amended. See Part 5.5 of ASME A17.1/CSA B44 for requirements for operation and maintenance.

SECTION 3011
RETROACTIVE REQUIREMENTS FOR EXISTING INSTALLATIONS

3011.1 Scope. Existing electric elevators, direct plumber and roped hydraulic elevators, escalators, electric and hand-powered dumbwaiters, hand-powered elevators and other conveyances shall comply with the provisions of this section.

3011.2 Key boxes and keys required. Key retainer boxes and keys shall be provided for all conveyances. *

3011.3 Key retainer box compliance. The key retainer box shall comply with Section 3011.3.1 or 3011.3.2,

3011.3.1 Conveyances installed between March 1, 1956 and August 14, 2004. A key retainer box locked and keyed to the standard City access key for elevator access and operation keys shall be provided. The key retainer box shall meet the following standards:

1. Dimensions – 8 inches high, 6 inches wide, 1 inch deep.
2. Material – 16 gauge steel welded.
3. Color – red (unless located in the main lobby above the hall call button, 6 feet nominal above the floor).
4. Labeling – "FOR FIRE DEPARTMENT USE."
5. Lock – Ace one-inch cylinder cam lock key #39504.

The key retainer box is to be installed at the designated recall floor above the Phase I recall switch or in the main lobby above the hall call button when no recall feature exists. The key retainer box is to be mounted 6 feet nominal above the floor. The *building official* is permitted to approve other locations upon request.

Key retainer boxes are permitted to comply with Section 3011.3.2 or 3016.12 as an alternative to complying with this section.

3011.3.2 Conveyances installed between August 15, 2004 through November 5, 2016. A key retainer box locked and keyed to the secure city access key for elevator and other conveyance access and operation keys shall be provided. The key retainer box shall meet the following standards:

1. Minimum dimensions – 6-1/2 inches high, 6 inches wide, 2 inches deep.
2. Material – at least 16 gauge steel welded.
3. Color - red (unless located in the main lobby above the hall call button, 6 feet above the floor).
4. Labeling - "For Emergency Use".

5. Lock - high security Medeco lock specified by the *building official*. Use of the key shall be restricted to fire, emergency response and elevator inspection personnel.

The key retainer box shall be flush or surface mounted, installed at the designated recall floor above the Phase I recall switch or in the main lobby above the hall call button if no recall feature exists. The key retainer box is to be mounted approximately 6 feet above the floor. The key retainer box shall be attached to the building so as to be able to withstand a force of 300 lbf/square foot applied horizontally at any point. In buildings with more than one elevator, the key retainer box shall be large enough to accommodate all required keys. The building official may approve other locations and custom box types upon request.

Key retainer boxes are permitted to comply with Section 3016.12 as an alternative to complying with this section.

3011.4 Elevator access keys. Keys for access to and for the operation of elevating equipment shall be tagged and retained in the key retainer box. The key retainer box shall contain fire emergency service keys (Phase I and II, one key for each switch) and keys for any of the following that are in the building:

1. Doors to the control room, machine room and machine space;
2. Secondary level door;
3. Pit door;
4. Roof door;
5. Independent, hospital emergency and/or attendant operation;
6. Hoistway access;
7. Mechanical hoistway access devices (broken arm, lunar, etc.);
8. Miscellaneous switches with locks;
9. Fire alarm panel room;
10. Sprinkler valve control room.

* **3011.5 Hoistways and related construction for electric and hydraulic elevators.** This section shall apply to all electric and hydraulic elevators.

3011.5.1 Hoistways.

3011.5.1.1 Hoistways enclosures.

1. Fire-resistive requirements found in the Seattle Building and Fire Codes apply to hoistway enclosures.
2. Where doors and hoistway enclosures are not required to be fire resistant, the hoistway shall be enclosed:
   - 2.1. With material, which may be solid or with openings that will reject a 1/2-inch diameter ball;
   - 2.2. To a height of 6 feet above each floor or landing and above the treads of adjacent stairways.
3. Enclosures shall be supported and braced as to deflect not over one inch when subjected to a 100 pound force perpendicularly applied at any point.
4. Enclosures adjacent to the counterweights shall extend the full height of the floor and extend 6 inches past the counterweight raceway.

3011.5.1.2 Windows in hoistway enclosures.

1. Guards are required on outside hoistway windows if the windows are located:
   - 1.1. Ten stories or less above a thoroughfare; or
   - 1.2. Three stories or less above the roof of an adjacent building.
2. Hoistway windows can be guarded by one of the following methods:
   - 2.1. By vertical bars at least 5/8 inch in diameter or equivalent, spaced no more than 10 inches apart, permanently and securely fastened in place; and
   - 2.2. By metal-sash windows having solid section steel muntins of no less than 1/8 thickness spaced no more than 8 inches apart.
3. Exterior hoistway windows shall be identified with 4-inch-high letters marked “Elevator.”

3011.5.1.3 Pipes conveying gases, vapors, or liquids in hoistways.

1. All steam and hot water pipes in hoistway shall be covered to prevent direct spray onto the elevator car if ruptured to comply with ASME A17.1, Rule 102.2 1990.
2. All other pipes or ducts currently in the hoistway shall be securely fastened to prevent excessive vibration.
3. No future pipes or ducts may be installed in the hoistway unless they directly pertain to the operation of the elevator.

3011.5.1.4 Access for maintenance and inspection.

1. Overhead sheave spaces requiring inspection and maintenance shall be provided with suitable access and decking to provide a safe space for personnel.
2. Guardrails shall be installed where decking does not cover the complete hoistway.
3. Guardrail and deck supports shall be similar to those required for the top of the elevator car and may be made of either wood or metal compatible with the existing hoistway construction.
4. Inspections and maintenance may be performed from the top of an elevator car if a ladder is not required to perform these functions.

3011.5.1.5 Traction elevator car top handrails. A standard railing shall be installed on the top of all traction elevators where the perpendicular distance between the edges of the car top and the adjacent hoistway enclosure exceeds 12 inches horizontal clearance. The railing shall be substantially constructed of metal and shall consist of a top rail, intermediate rail and post. The top rail shall have a smooth surface and the upper surface shall be located at a vertical height of 42 inches. The intermediate rail shall be located approximately halfway between the top rail and the car top. There shall be a minimum of 4 inches of clearance above the top rail when the car is at its furthest point of travel. If the vertical clearance from the car top to the hoistway enclosure, including gravity stopping distance, is less than 48 inches away, the top handrail height may be reduced to 42 inches plus or minus 3 inches. If the clearances will not allow a 39-inch handrail, do not install the top of car railing, instead provide signage required by 3011.5.1.7.

3011.5.1.6 Hydraulic elevator car top handrails. A standard railing shall be installed on the top of hydraulic elevators installed in unenclosed hoistways. The railing shall be substantially constructed of metal and shall consist of a top rail, intermediate rail and post. The top rail shall have a smooth surface and, the upper surface shall be located at a vertical height of 42 inches plus or minus 3 inches. The intermediate rail shall be located approximately halfway between the top rail and the car top. There shall be a minimum of 4 inches of clearance above the top rail when the car is at its furthest point of travel on the mechanical stop. If the vertical clearance of 4 inches cannot be achieved, do not install car top railing, instead provide signage required by 3011.5.1.7.

3011.5.1.7 Signage requirements for traction elevators with minimal overhead clearances. Elevators that do not have a minimum of 24 inches of clearance from the crosshead, or any equipment mounted on the crosshead, to the lowest member of the overhead structure in the hoistway when the car has reached its maximum upward movement shall have signage. A sign shall be located near the top of car inspection station. An additional sign shall be posted on the hoistway wall. This sign shall be visible when accessing the car top. The sign shall consist of alternating 4-inch diagonal red and white stripes and shall clearly state “danger low clearance” in lettering not less than 4 inches in height.

3011.5.2 Machine rooms and machinery spaces.

3011.5.2.1 Doors to elevator and dumbwaiter machine rooms and machinery spaces. Doors to elevator and dumbwaiter machine rooms, control rooms and machinery spaces shall be self-closing and self-locking. The lock shall be a spring-type lock arranged to permit the door to be opened from the inside without a key, incapable of being left in the unlocked position, and accessible only by a key from the outside. **

3011.5.2.2 Machine rooms and machinery spaces: lighting and receptacles. **

1. Provide and maintain a clear, permanent and safe means of access to machine rooms and machinery spaces.
2. Permanent electric lighting shall be provided in all machine rooms and machinery spaces. The illumination shall be not less than 10 foot-candles (108 lux) at the floor level on installations prior to August 15, 2004. The lighting control switch shall be located within easy reach of the access to the room or space. Where practicable, the control switch shall be located on the lock-jamb side of the access door.
3. Where provided, duplex and simplex receptacles for machine rooms and machinery spaces shall be permanently grounded.
4. Provide a sign on the elevator machine room door in 1 inch high stating Elevator Machine Room.

3011.5.2.3 Pipes conveying gases, vapors, or liquids in machine rooms and machinery spaces.

1. Pipes conveying gases, vapors or liquids are not permitted to be installed in machinery spaces, machine rooms and control rooms unless necessary for operation or maintenance of the elevator and not used for any other purpose.
2. All other pipes or ducts currently in the machine rooms and machinery spaces shall be securely fastened to prevent excessive vibration.
3. No future pipes or ducts shall be installed in the machine rooms and machinery spaces.

3011.5.2.4 Protection from weather. Elevator machines and control equipment shall be protected from the weather.

3011.5.2.5 Guards. In hoistways, machine rooms and machinery spaces.

1. Where feasible, gears, sprockets, sheaves, cables, tapes, belts and chains shall be fitted with suitable guards to prevent accidental contact.

2. Openings in machine room floors above the hoistway shall be guarded to prevent tools from falling into the hoistway below.
3. Open grating in machine room floors shall reject a ball 1/2 inch in diameter.
4. Ventilation grids where exposed to the hoistway below shall be firmly fastened to prevent accidental removal and shall be fitted with 1/2 inch wire mesh under the grid.

** **3011.5.2.6 Anchorage for elevator equipment.** All elevator equipment, hydraulic or cable type shall be anchored.

** **[W] 3011.5.2.7 Missing data tags.** In the event an existing data tag cannot be located, a replacement tag shall be created specifying the date of verification of known information.

3011.5.3 Pits.

** **3011.5.3.1 Access to pits.**

1. A safe means of access for authorized personnel shall be provided to all pits.
2. Access doors, if provided, shall be kept closed and locked.
3. Access ladders shall be installed in elevator pits 3 feet or deeper.

[W] Where constraints prohibit the installation of a pit ladder, a retractable ladder shall be permitted to be installed in accordance with 2.2.4.2.7 and 2.2.4.2.8 of ASME A17.1/CSA B44 -2019.

3011.5.3.2 Drains.

1. Pit drains connected directly to sewers are prohibited.
2. Sumps, with or without pumps, are permitted.

** **3011.5.3.3 Illumination of pits.** For installations prior to August 15, 2004, a permanent lighting fixture shall be provided in all pits which shall provide an illumination of not less than 5 foot-candles at the pit floor. A light switch shall be provided inside the hoistway and be so located as to be accessible from the pit access door and adjacent to the pit ladder if provided. Light bulbs shall be guarded to prevent contact and accidental breakage. A permanent grounded outlet shall be provided in all pits.

3011.5.3.4 Counterweight pit guards.

1. Where feasible, unperforated metal guards shall be installed in the pit on the open side, or sides, on all counterweights where spring or solid-type buffers are used or where oil buffers attached to the counterweight are used.

   Exception: Where compensating chains or ropes are attached to the counterweight the guard may be omitted on the side facing the elevator or to which the chains or ropes are attached.
2. Guards shall extend from a point not more than 12 inches above the pit floor to a point not less than 7 feet nor more than 8 feet above such floor; and be fastened to a metal frame properly reinforced and braced to be at least equal in strength and stiffness to a No. 14 U.S. gauge sheet steel.

3011.5.4 Protection of space below hoistways.

3011.5.4.1 Spaces below hoistways. Where the space below the hoistway is not permanently secured against access, the following requirements shall be conformed to:

1. Counterweights shall be provided with safeties.
2. The cars and counterweight shall be provided with spring or oil buffers.
3. Car and counterweight buffer supports shall be of sufficient strength to withstand, without permanent deformation, the impact resulting from buffer engagement at the following speeds.
4. Governor tripping speed where the safety is governor operated.
5. 125% of the rated speed where the safety is not governor operated.

3011.5.5 Hoistway entrances.

3011.5.5.1 Doors or gates required.

1. Passenger elevators. Hoistway landing openings for passenger elevators shall be provided with entrances which guard the full width and height of the openings. The panels of entrances used with automatic-operation passenger elevators shall have no hand latches or other hand operated door fastening devices, nor shall such panels;
2. Freight Elevators. Hoistway landing openings for freight elevators shall be provided with entrances which guard the full width of the opening. Gates and doors shall conform to the following requirements:

   2.1. Balanced type vertically sliding hoistway gates shall extend from a point not more than 2 inches from the landing threshold to a point not less than 66 inches above the landing threshold.

   2.2. Gates shall be solid or shall be openwork of a design to reject a 2 inches in diameter ball and be located so that the distance from the hoistway face of the gate to the hoistway edge of the landing sill is no more than 2-1/2 inches.

2.3. Gates shall be constructed of metal or wood and shall be so designed and guided that they will withstand a lateral pressure of 100 pounds applied at approximately their center without breaking or being permanently deformed and without displacing the gate from its guides or tacks.

2.4. At the top landing, a gate 66 inches (1.65 M) high may be used if there is not sufficient clearance for a 6 foot (1.83 m) high gate. When the requirements of 3011.5.1.1 allow nonfire-resistive hoistway enclosures, a gate may be used.

2.5. Gates shall be constructed of either metal or wood.

2.6. Gates shall withstand a lateral pressure of 100 pounds, applied at approximately their center, without braking, be permanently deformed of be displaced from their guides or tracks.

2.7. The maximum vertical opening between a landing sill and a door or gates is 2 inches.

2.8. The distance between the gate's hoistway face and the hoistway landing edge shall not exceed 2-1/2 inches.

3011.5.5.2 Closing of hoistway doors.

1. Horizontally sliding doors of automatic-operation elevators shall be provided with door closers arranged to close an open door automatically if the car for any reason leaves the landing zone.
2. Horizontal swinging single or center-opening doors of automatic-operation elevators shall be self-closing.
3. Door closers are not required for the swinging portion of combination horizontally sliding and swinging doors
4. On center-opening doors that utilize relating cables if the cabling fails or when the cabling is replaced, a method shall be provided to ensure that both doors automatically close if the car for any reason leaves the landing zone.

3011.5.5.3 Hoistway door vision panels.

1. Manually operated or self-closing doors of the vertically or horizontally sliding type, for elevators with automatic or continuous-pressure operation, shall be provided with a vision panel except at landings of automatic-operation elevators where a hall position indicator is provided.
2. In multisection doors, the vision panel is required in one section only, but may be placed in all sections.
3. All horizontally swinging doors shall be provided for with vision panels.
4. Vision panels may be provided for any type of hoistway door regardless of the type of operation of the elevator. Where provided, vision panel shall meet the following requirements:

4.1. The area of any single vision panel shall be at least 25 square inches, with the total area of one or more vision panels in any hoistway door shall be not more than 80 square inches.

4.2. Each clear panel opening shall reject a ball 6 inches (152 mm) in diameter.

4.3. Muntins between panel sections shall be of noncombustible material and of substantial construction. If located on the landing side, they shall be flush with the surface of the landing side of the door.

4.4. Panel openings shall be glazed with clear wire glass not less than 1/4 inch (6.3 mm) thick.

4.5. A panels center shall be located not less than 54 inches (1.37 m) but nor more than 66 inches (1.68 m) above the landing except, that for vertically sliding, biparting counterbalanced doors, it shall be located to conform with the dimensions specified to the extent that the door design will permit.

4.6. The vision panels in horizontally swing doors shall be located for convenient vision when opening the door from the car side.

4.7. Wire-glass panels in power-operated doors shall be substantially flush with the surface of the landing side of the door.

4.8. Vision panel frames shall be secured by means of nonreversible screws or other tamper proof fasteners.

4.9. Vision panels which do not meet the requirements of subsections 4.1 through 4.8 of this section shall be protected by protective grilles made of number 15 gauge stainless or galvanized steel in accordance with the following specifications.

(i) Grilles shall be sized to fit within or over the vision panel frame and completely cover the vision panel opening in the hoistway door.

(ii) Grilles shall be secured by means of nonreversible screws or other tamper-proof fasteners.

(iii) Grilles shall contain openings which shall not be larger than 3 inches (19.1 mm) by 3/4 inches (19.1 mm) or 3 inches (19.1 mm) in diameter.

(iv) All edges shall be beveled and free of burrs.

(v) Grilles shall be installed on the hoistway side of the door.

3011.5.5.4 Door hangers. Door hangers for horizontal slide type entrances shall conform to the following:

1. Means shall be provided to prevent the hangers from jumping the track.
2. Stops shall be provided in the entrance assembly to prevent hangers from overrunning the end of the track.
3. Power-operated doors shall be constructed to withstand, without damage or appreciable deflection, an imposed static load equal to four times the weight of each panel as applied successively downward and upward at the vertical centerline of the panel.

3011.5.5.5 Nonshearing astragals. On a vertically sliding, biparting, counterbalanced hoistway door, a fire-resistive, nonshearing, an noncrushing member of either the meeting or overlapping type shall be provided on the upper panel to close the distance between the rigid door sections when in contact with the stops. Rigid members which overlap the meeting edge, and center-latching devices are prohibited.

3011.5.5.6 Pull straps. Manually operated vertical slide biparting elevators doors which can be operated from the landings shall be provided with pull straps on the inside and outside of the upper panel where the lower edge of the upper panel is more than 6 feet 6 inches (1.98 m) above the landing when the panel is in the fully open position. The length of the pull straps shall be as follows:

1. The bottom of the strap shall be not more than 6 feet 6 inches (1.98 m) above the landing when the panel is in the fully opened position.
2. The length of the strap shall not be extended by means of ropes or other materials.
3. Where pull straps are provided on the car side of doors of elevators which can be operated from the car only, the length of the pull straps shall conform to the requirements specified in 1 and 2 of this section.

3011.5.5.7 Landing sill clearances. The clearance between the car-platform sill and the hoistway edge of any landing sill, or the hoistway side of any vertically sliding counterweighted, or of any vertically sliding counterbalanced biparting hoistway door, shall be:

1. At least 1/2 inch (13 mm) where side car guides are used.
2. At least 3/4 inch (19 mm) where corner car guides are used.
3. In all cases the maximum clearance shall be not more than 1-1/2 inch (38 mm).

3011.5.5.8 Threshold clearance. The maximum dimension from the hoistway door or gate face to the hoistway edge of the threshold shall not exceed 2-1/4 inches.

** **3011.5.5.9 Floor number.** Elevator hoistways shall have floor numbers, not less than 2 inches high, placed on the walls and/or doors of hoistways.

** **3011.5.5.10 Additional doors other than hoistway and car doors installed between January 1992 and November 5, 2016.** Doors other than the hoistway door and the elevator car door are prohibited at the point of access to or from an elevator car.

Exception: Doors that are readily openable from the car side without a key, tool, or special knowledge or effort.

3011.5.6 Hoistway door locking devices, parking devices, and access.

3011.5.6.1 Hoistway door or gate locking devices.

1. Hoistway doors or gates for passenger elevators shall be equipped with hoistway-unit system hoistway-door interlocks.
2. Hoistway doors or gates for freight elevators shall be equipped with hoistway-unit system hoistway-door interlocks, or an approved type combination electric contact and mechanical lock.
3. Combination locks and electric contacts, or interlocks shall be so located that they are not accessible from the landing side when the hoistway doors or gates are closed.

3011.5.6.2 Elevator parking devices.

1. Elevators that are operated from within the car only, shall have elevator parking devices installed at every landing that is equipped with an unlocking device.
2. On elevators that are not operated from within the car only, a parking device shall be provided at one landing and may be provided at other landings. This device shall be located at a height not greater than 6 feet 11 inches (2.11 m) above the floor.
3. Parking devices are not required for elevators having hoistway doors that are automatically unlocked when the car is within the landing zone.
4. Parking devices shall conform to the following specifications:

   4.1. They shall be mechanically or electrically operated.

4.2. They shall be designed and installed so that friction or sticking or the breaking of any springs used in the device will not permit opening or unlocking a door when the car is outside the landing zone of that floor.

4.3. Where springs are used, they shall be of the restrained compression type which will prevent separation of the parts in case the spring breaks.

3011.5.6.3 Access to hoistway. Hoistway door unlocking devices or hoistway access switches shall be provided on all elevators at the upper landing to permit access to the top of the car and at the lowest landing if this landing is the normal point of access to the pit. Hoistway door unlocking devices may be provided at all landings for emergency purposes.

1. Hoistway door unlocking devices. Hoistway door unlocking devices shall conform to the following:

1.1. The device shall unlock and permit the opening of the hoistway door from the access landing irrespective of the position of the car.

1.2. The devices shall be designed to prevent unlocking the door with common tools.

1.3. The operating means for unlocking the door shall be available to and used only by inspectors, elevator maintenance and repair personnel, and qualified emergency personnel.

1.4. The unlocking-device keyway shall be located at a height no greater than 6 feet 11 inches above the floor.

2. Hoistway access switches. Hoistway access switches shall conform to the following:

2.1. The switch shall be installed only at the access landings.

2.2. The switch shall be installed adjacent to hoistway entrance at the access landing with which it is identified.

2.3. The switch shall be of the continuous-pressure spring-return type, and shall be operated by a cylinder-type lock having not less than five-pin or five-disk combination with the key removable only when the switch is in the “off” position. The lock shall not be operable by any key which will operate locks or devices used for other purposes in the building. The key or combination shall be available to and used only by inspectors and elevator maintenance and repair personnel.

2.4. The operation of the switch at either access landing shall permit, and may initiate and maintain, movement of the car with the hoistway door at this landing unlocked or not in the closed position, and with the car door or gate not in the closed position, subject to the following:

(i) The operation of the switch shall not render ineffective the hoistway door interlock or electric contact at any other landing.

(ii) The car cannot be operated at a speed greater than 150 fpm (0.76 m/s).

(iii) For automatic and continuous-pressure operation elevators, provided: Landing operating devices of continuous-pressure operation elevators, and car and landing operating devices of automatic operation elevators shall first be made inoperative by means other than the access switch; and power operation of the hoistway door and/or car door or gate is inoperative.

(iv) Automatic operation by a car-leveling device is inoperative.

(v) The top-of-car operating device is inoperative.

(vi) The movement of the car initiated and maintained by the upper access switch shall be limited in the down direction to a gravel not greater than the height of the car crosshead above the car platform, and limited in the up direction above the upper access landing to the distance the car apron extends below the car platform. Where electronically operated switches, relays, or contactors are used to render inoperative the hoistway-door interlock or electric contact or the car door or gate electric contact, the control circuits shall be arranged to conform to the requirements of 3011.6.3.5 and in addition, to render the normal car and hall operation ineffective if any such switch, relay, or contactor fails to function in the intended manner.

3011.5.7 Power operation of doors and gates.

3011.5.7.1 Reopening device for power-operated car doors or gates.

1. Where required a power-operated car door or gate shall be provided with a reopening device which will function to stop and reopen the car door or gate and the adjacent hoistway door in the event that the car door or gate is obstructed while closing. If the closing kinetic energy is reduced to a 2-1/2-ft-lbf (3.39 J) or less, the reopening device shall be rendered inoperative.

2. For center-opening doors or gates, the reopening device shall be so designed and installed that the obstruction of either door or gate panel when closing will cause the reopening device to function.

3011.5.7.2 Photo electric or electric eye devices. An elevator equipped with a photo electric or electric eye device for reopening of the car and hoistway doors shall be provided with a means that will automatically time-out and close the door

if it has been obstructed for 20 seconds. The photo electric or electric eye device shall not be reestablished until the doors have fully closed. There are two exceptions to this requirement:

Exceptions:

1. The *building official* may authorize hospital or nursing homes to allow obstructed doors to close within 35 seconds after the expiration of the normal door open time.
2. When smoke detectors are used to bypass photo electric or electric eye devices, the doors are not required to time-out and close except under Phase I conditions in accordance

3011.6 Machinery and equipment for electric elevators.

3011.6.1 Scope. This section is a minimum standard for all existing electric elevators. It applies to other equipment only as referenced in the applicable part.

3011.6.1.1 Buffers and bumpers. Car and counterweight buffers or bumpers shall be provided. Solid bumpers may be used in lieu of buffers:

1. Where the rated speed is 50 fpm (0.25 m/s) or less; or
2. Where Type C safeties are used.

3011.6.1.2 Counterweights. On rod type counterweights, the rod nuts shall be cotter-pinned and the tie rods shall be protected so the head weight cannot crush the tie rods on buffer engagement.

1. The weights shall be protected so that they cannot be dislodged.
2. Compensating chains or ropes shall be fastened to the counterweight frame directly or to a bracket fastened to the frame and shall not be fastened to the tie rods.

3011.6.2 Car frames and platforms.

3011.6.2.1 Car platforms. Every elevator car shall have a platform consisting of a nonperforated floor a platform frame supported by the car frame and extending over the entire area within the car enclosure.

1. Holes in the floor for the safety plank wrench, etc., shall be covered and secured.
2. The platform frame members and the floor shall be designed to withstand the forces developed under the loading conditions for which the elevator is designed and installed.

3011.6.2.2 Platform guards (aprons). The entrance side of the platform of passenger and freight elevators equipped with leveling devices or truck-zoning devices shall be provided with smooth metal guard plates of not less than 0.0598 inch (1.519 mm) thick steel, or material of equivalent strength and stiffness, adequately reinforced and braced to the car platform and conforming with the following:

1. The guard plate shall extend not less than the full width of the widest hoistway door opening.
2. It shall have a straight vertical face, extending below the floor surface of the platform, of not less than the depth of the leveling of truck zone, plus 3 inches (76 mm).
3. If new guards are installed, the lower portion of the guard shall be bent back at an angle of not less than 60° nor more than 75° from the horizontal.
4. The guard plate shall be securely braced and fastened in place to withstand a constant force of not less than 150 lbf (667 N) applied at right angles to and at any position on its face without permanent deformation.

3011.6.2.3 Hinged platform sills. Hinged platform sills, where provided, shall be provided with electric contacts which will prevent operation of the elevator by the normal operating device unless the hinged sill is within 2 inches (51 mm) of its fully retracted position. The elevator will be operated by the leveling device in the leveling zone with the sill in any position.

3011.6.2.4 Floating (movable) platforms. Floating (movable) platforms which permit operation of the elevator when the car door or gate is not in the closed position are prohibited.

3011.6.3 Car enclosures.

3011.6.3.1 Car enclosures. Car enclosures for freight and passenger cars shall conform with the following:

1. Freight elevator cars:
   - 1.1. Cars shall be enclosed to a height of at least 6 feet from the floor on all sides, where there are no hoistway doors or gates, with solid panel or openwork which will reject a 2-inch diameter ball.
   - 1.2. On the side of the car adjacent to the counterweight runway and extending 6 inches each side of the counterweight runway, the enclosure shall extend to the car top or underside of car crosshead.
   - 1.3. If overhead protection is of openwork material, it shall reject a 1-1/2 inch ball and shall be sufficiently strong to support 300 pounds applied at any point. Simultaneous application of these loads is not required.

1.4. Suitable overhead protection may be installed directly over the area where the operator runs the controls, providing the overhead protections covers sufficient area for save protection of operator.

2. Passenger elevator cars:

2.1. Passenger elevator cars shall be fully enclosed on all sides and the top, except the opening for entrances.

2.2. Enclosures shall be of metal or wood in conformity with local fire regulations.

2.3. The car top shall be sufficiently strong to support a load of 300 pounds applied at any point. Simultaneous application of these loads is not required.

3011.6.3.2 Material for passenger car enclosure. All materials exposed to the car interior and the hoistway shall be metal or shall conform to the following: **

1. Materials in their end use configuration, other than those covered by paragraph (2) below, shall conform to the following requirements, based on the tests conducted in accordance with the requirements of ASTM E 84, ANSI/UL 723 or NFPA 252:

1.1. flame spread rating of 0 to 75;

1.2. smoke development of 0 to 450.

2. Napped, tufted, wove, looped, and similar materials in their end use configuration on car enclosure walls shall have a flame spread rating of 0 to 25.

3. Padded protective linings, for temporary use in passenger cars during the handling of freight, shall be of materials conforming to either paragraph 1. or (2) above. The protective lining shall clear the floor by not less than 4 inches (102 mm).

4. Floor covering, underlayment, and its adhesive shall have a critical radiant flux of not less than 0.45 W/ cm2 as measured by ASTM E 648. Floor finish materials of a traditional type such as wood, vinyl, linoleum and terrazzo are permitted to be used.

5. Carpeting without padding may be used for interior finishes provided that it has a Class I rating, a flame spread of 25 or less which shall include all assembly components except the adhesive.

Exception: Handrails, operating devices, ventilating devices, signal fixtures, audio and visual communication devices, and their housings are not required to comply with this Section 3011.6.

3011.6.3.3 Interior alteration. Alterations or modifications of elevator car interiors shall comply with ASME A17.1/CSA B44 8.7.2.15.2 increase or decrease in deadweight of car). *Seattle Building Code* requirements concerning flame spread rating for wall coverings (See Chapter 8) and lighting requirements of ASME A17.1/CSA B44. **

3011.6.3.4 Car doors and gates. Car doors or gates shall be required at each entrance to the elevator car.

1. Car doors or gates may be horizontal or vertical sliding.

2. Gates, except collapsible, may be solid or may be openwork of a design to reject a ball 2 inches in diameter ball. Gates shall be:

2.1. Constructed of metal or wood; and

2.2. Designed shall be so designed that they will withstand a lateral pressure of 100# applied at approximately their center without breaking or being permanently deformed and without displacing the gate from its guides or tracks.

3. Collapsible gates shall reject a 3-inch diameter ball when fully extended (closed position) when installed on passenger cars and reject a 4-1/2 ball when fully extended (closed position) when installed on freight cars. Such gates shall not be power-opened for more than one-third of their clear opening distance or for a maximum power opening distance not to exceed 10 inches. Collapsible gates shall have at least every fourth vertical member guided at the top and every second vertical member guided at the bottom.

4. Handles of manually operated collapsible gates nearest the car operating device on elevators operated from the car only shall be so located that the nearest handle is not more than 48 inches (1.22 m) above the car floor. Gate handles shall be provided with finger guards.

5. Car doors and gates when in the fully closed position shall conform to the following specifications:

5.1. For passenger cars they shall protect the full width and height of the car entrance opening provided that vertically sliding gates may extend from a point not more than 1 inch above the car floor to a point not less than 6 feet above the floor.

5.2. For freight elevators they shall protect the full width of the car entrance opening. Car doors shall extend from the car floor to a height of not less than 6 feet above the car floor. Vertically sliding gates shall extend from a point not more than 1 inch above the car floor to a point not less than 6 feet above the car floor.

6. Car doors and gates of electric and electro-hydraulic elevators shall be equipped with approved car door or gate electric contacts which will prevent operation of the elevator by the normal operating device unless the car door or gate is in the closed position.

3011.6.3.5 Location of car doors and gates. All elevators, except freight elevators equipped with horizontally swinging doors which are not accessible to the general public and located in factories, warehouses, garages, and similar buildings, shall conform to the following:

1. Location. Doors or gates for automatic or continuous-pressure operation elevators shall be so located that the distance from the face of the car door or gate to the face of the hoistway door shall be not more than the following:
   - 1.1. Where a swinging-type hoistway door and a car gate are used, 4 inches (102 mm);
   - 1.2. Where a swinging-type hoistway door and a card door are used 5-1/2 inches (140 mm);
   - 1.3. Where a sliding-type hoistway door and a car gate or door are used, 5-1/2 inches (140 mm).
2. Measurement of distances. The distances specified shall be measured as follows:
   - 2.1. Where a multisection car door and multisection hoistway door are used or where one of these doors is multisection and the other is single section, between the sections of the car door and the hoistway doors nearest to each other;
   - 2.2. Where a multisection car door and a swinging-type hoistway door are used, between the hoistway door and the section of the car door farthest from it. Where space conditions require the use of three speed car doors, the distance shall be measured from the intermediate speed panel;
   - 2.3. Where a car gate is used, between the car gate and the section of the hoistway door nearest to the car gate.
3. Where existing distances are greater than specified by paragraphs 1 and 2 of this section, a space guard of sheet metal shall be provided, attached to the hoistway door and/or car door.
   - 3.1. The guard is to be mounted to the door by a tamper-proof means.
   - 3.2. The bottom of the guard shall be not less than 1/8 (3.2 mm) nor more than 1/2 inch (13 mm) from the edge of the sill.
   - 3.3. The face of the guard shall run vertically not less than 40 inches (1.01 m) nor more than the height of the lower edge of the vision panel.
   - 3.4. The guard shall extend the full width of the door.
   - 3.5. The top of the guard shall be inclined toward the face of the door at angle of not less than 60° nor more than 75° from the horizontal.
   - 3.6. Exposed edges shall be beveled or rolled to eliminate sharp edges.
   - 3.7. The guard shall be sufficiently rigid or reinforced to prevent collapsing or denting.
   - 3.8. Mounting of the guard shall have proper clearances at the bottom and sides to permit easy closing of the door and shall not interfere with the self-closing.
   - 3.9. On multisection horizontally sliding doors only the leading or fast panel shall be fitted with the space guard. For swinging doors, the sides of the guard shall be closed if the depth exceeds 5 inches (127 mm).
4. On horizontally sliding hoistway doors where existing clearances are greater than specified by subsections 1 and 2 of this section, a vertical sight guard shall be mounted to the leading edge of the hoistway door. The sight guard shall
   - 4.1. Be mounted with a vertical clearance of not more than 1/2 inch (13 mm) to the sill, to a height of not less than 6 feet (1.8 m); and
   - 4.2. Project from the door, a distance to not more than 1/2 inch (13 mm) nor less than 1/8 inch (3.2 mm) from the hoistway edge of the sill.
5. Only the following devices may be used to render inoperative hoistway door interlocks, the electric contacts of hoistway door combination mechanical locks and electric contacts, or car door or gate electrical contacts:
   - 5.1. Leveling devices
   - 5.2. Truck-zoning devices;
   - 5.3. Hoistway access switch.
   - 5.4. Existing devices which do not conform to the above shall be removed.

3011.6.3.6 Control and operating circuit requirements. The failure of any single magnetically operated switch, contactor, or relay to release in the intended manner, or the occurrence of a single accidental ground, shall not permit the car to start or run if any hoistway door interlock is unlocked or if any hoistway door or car door or gate electric contact is not in the closed position.

3011.6.3.7 Emergency exits.

1. Top emergency exits.
   1.1. Cars provided with a car top emergency exit. Top emergency exit covers shall be hinged or otherwise attached to the car top so that the cover can be opened from the top of the car only and opens outward.
   1.2. The exit cover of the lower compartment of a multideck elevator car shall be openable from either compartment.
2. Side emergency exits.
   2.1. Side emergency exit doors or panels, where provided, shall have a lock arranged so that the door may be opened from the inside of the car only by a special shaped removable key and outside the car by means of a nonremovable handle.
   2.2. All side emergency car exits shall be equipped with electric contacts to prevent the movement of the car if the exit door or panel is not closed, see 3011.6.10.5(16). Side emergency exit door panels shall open only into the car.

3011.6.3.8 Car illumination. **

1. Interiors of cars shall be provided with not less than 2 electric lights.
2. The minimum illumination at the car threshold, with the door closed, shall not be less than:
   2.1. For passenger elevators: 5 footcandle (54 lux);
   2.2. For freight elevators 2-1/2 footcandle (27 lux).
3. Light control switches are not required, but if provided, they shall be located in or adjacent to the car's onboard operating device.
4. In elevators having automatic operation, the light control switch shall be of the key-operated type or located in a fixture with a locked cover.
5. Light fixtures mounted on car tops shall be equipped with a non-key operated switch located in or adjacent to the fixture.
6. A readily accessible and labeled toggle-type test switch shall be provided on the top of the car to cut lighting power manually to test the emergency lighting.

3011.6.3.9 Car top work light. A permanently wired work light and outlet shall be installed on the top of freight and passenger elevators to provide adequate illumination for inspection and work in the hoistway. The top of car light fixtures shall be provided with a non-keyed switch in or adjacent to the fixture. The fixture shall be protected from accidental breakage. **

3011.6.4 Safeties.

3011.6.4.1 Safeties. The car of every elevator suspended by wire ropes shall be provided with car safeties. The safety device shall be capable of stopping and sustaining the entire car with its rated load in the event of cable severance or overspeed. There shall be a switch provided on the car actuated by the setting of the safeties that will remove the electric power from the driving machine motor and brake. Car safeties are identified and classified on the basis of performance characteristics after the safety begins to apply pressure on the guide rails.

1. Type A safeties. Safeties which develop a rapidly increasing pressure on the guide rails during the stopping interval, the stopping distance being very short due to the inherent design of the safety. The operating force is derived entirely from the mass and motion of the car or the counterweight being stopped. These safeties apply pressure on the guide rails through eccentrics, rollers, or similar devices without any flexible medium purposely introduced to limit the retarding force and increase the stopping distance.
2. Type B safeties. Safeties which apply limited pressure on the guide rails during the stopping interval, and which provide stopping distances that are related to the mass being stopped and the speed at which application of the safety is initiated. Retarding forces are reasonably uniform after the safety is fully applied. Continuous tension in the governor rope may or may not be required to operate the safety during the entire stopping interval. Minimum and maximum distances are specified on the basis of governor tripping speed.
3. Type C safeties (Type A with oil buffers). Safeties which develop retarding forces during the compression stroke of one or more oil buffers interposed between the lower members of the car frame and a governor-operated Type A auxiliary safety plank applied on the guide rails. The stopping distance is equal to the effective stroke of the buffers.
4. Type G safeties. Safeties similar to Type B except having a gradually increasing retarding force. This safety may be either of the wedge clamp type or the flexible guide clamp type applied a cable which unwinds a drum below the car floor.

5. Slack rope safeties that are actuated by the slackening or breaking o the hoisting ropes. This type of safety is not actuated by an overspeed governor.

3011.6.4.2 Maximum permissible movement of governor rope to operate the safety mechanism. For all Type B safeties, the movement of the governor ropes relative to the car or the counterweight, respectively, required to operate the safety mechanism from its fully retracted position to a position where the safety jaws begin to exert pressure against the guide rails shall not exceed the following values based on rated speed:

1. For car safeties:
   1.1. 200 fpm (1.02 m/s) or less: 42 inches (1.07 m)
   1.2. 202 fpm (1.03 m/s) to 375 fpm (1.90 m/s): 36 inches (914 mm).
   1.3. Over 375 fpm (1.91 m/s): 30 inches (762 mm).
2. For counterweight safeties: 42 inches (1.07 m) for all speeds.
3. Drum-operated car and counterweight safeties, requiring continual unwinding of the safety drum rope to fully apply the safety, shall be so designed that not less than tree turns of the safety rope will remain on the drum after the overspeed test of the safety has been made with the rated load in the car.

3011.6.4.3 Rail lubricants and lubrication plate. Rail lubricants or coatings which will reduce the holding power of the safety or prevent its functioning as required shall not be used.

1. A metal plate shall be securely attached to the car crosshead in an easily visible location and, where lubricants are to be used, shall carry the notation, “Consult manufacturer of the safety for the characteristics of the lubricant to be used.” If lubricants are not to be used, the plate shall so state.
2. If lubricants other than those recommended by the manufacturer are used, a safety test should be made to demonstrate that the safety will function as required.

3011.6.5 Speed governors.

3011.6.5.1 Governors. A speed governor or inertia trip safety or a slack cable operated safety shall be installed on all elevators and shall be so designed that it will actuate the car safeties before the car attains a speed of 140% of the rated speed. Governor ropes shall be not less than 3/8 inch in diameter, if iron or steel rope, and not less than 3/4 inch if manila rope. Tiller rope shall not be used.

3011.6.5.2 Speed governor overspeed and car safety mechanism switches.

1. A switch shall be provided on the speed governor and operated by the overspeed action of the governor when used with Type B and C car safeties of elevators having a rated speed exceeding 150 fpm (0.76 m/s).
2. A switch shall be provided on the speed governor when used with a counterweight safety for any car speed.
3. For static control, an overspeed switch shall be provided regardless of rated speed and shall operate in both directions of travel.
4. These switches shall, when operated, remove power from the driving-machine motor and brake before or at the same time of application of the safety.
5. Switches used to perform the function specified shall be positively opened and remain open until manually reset. (6) Switches operated by the car safety mechanism shall be of a type which will not reset unless the car safety mechanism has been returned to the “off” position.

3011.6.6 Capacity and loading.

3011.6.6.1 Minimum rated load for passenger elevators. The rated load in pounds (kilograms) for passenger elevators shall be based on the inside net platform areas, and shall be not less than shown in the table below. The inside net platform areas shall be determined as shown in the following table which shows the maximum inside net platform areas for the various common rated loads. If other rated loads are used, they shall be not less than as follows:

1. For an elevator having an inside net platform area of more than 50 feet squared (4.65 m squared),

   W = 0.667AA squared + 66.7A.
2. For an elevator with an inside net platform area of more than 50 feet squared (4.65 m squared),

   W = 0.0467A squared + 125A – 1367.

TABLE 3011.6.6.1
MAXIMUM* INSIDE NET PLATFORM AREAS FOR VARIOUS RATED LOADS

Rated Load, lbs	Inside Net Platform Area, ft.^{2}	Rated Load, lbs	Inside Net Platform Area, ft.^{3}
500	7	5,000	50
600	8.3	6,000	57.7
700	9.6	7,000	65.3
1,000	13.25	8,000	72.9
1,200	15.6	9,000	80.5
1,500	18.9	10,000	88
1,800	22.1	12,000	103
2,000	24.2	15,000	125.1
2,500	29.1	18,000	146.9
3,000	33.7	20,000	161.2
3,500	38	25,000	196.5
4,000	42.2	30,000	231
4,500	46.2		
*To allow for variations in cab designs, an increase in the maximum inside net platform area not exceeding 5% will be permitted for the various rated loads.			

NOTE:
A = inside net platform area, ft. squared
W = minimum rated load, lb.

3011.6.6.2 Use of partitions for reducing inside net platform area. When partitions are installed in elevator cars for the purpose of restricting the platform net area for passenger use, they shall be permanently fastened in place.

1. Gates, doors, or handrails shall not be used as partitions.
2. Partitions shall be installed to permit approximately symmetrical loading.
3. When conditions do not permit symmetrical loading, guide rails, car frames, and platforms shall be capable of sustaining the resulting stresses and deflections.

3011.6.6.3 Minimum rated load for freight elevators. The minimum rated load for freight elevators in pounds (kilograms) shall be based on the weight and class of the load to be handled, but shall in no case be less than the minimum specified in subsection (2) of this section for each class of loading based on the inside net platform area. Freight elevators shall be designed for one of the following classes of loading:

1. Class A – General freight loading: Where the load is distributed, the weight of any single piece of freight or of any single hand truck and its load is not more than one-quarter of the rated load of the elevator, and the load is handled on and off the car platform manually or by means of hand trucks. For this class of loading, the rated load shall be based on not less than 50 lbs./ft. squared of inside net platform area.
2. Class B – Motor vehicle loading: Where the elevator is used solely to carry automobile trucks or passenger automobiles up to the rated load of the elevator. For this class of loading, the rated load shall be based on not less than 30 pounds/foot squared of inside net platform area.
3. Class C – Industrial truck loading: Where the load is carried in transit or is handled on and off the car platform by means of power industrial trucks or by hand trucks having a loaded weight more than one-quarter the rated load of the elevator. For this class of loading the following requirements apply:
   - 3.1. The rated load shall be based on not less than 50 pound/foot squared (244 kg/m squared) of inside net platform area;
   - 3.2. The weight of the loaded industrial truck shall not exceed the rated load of the elevator;
   - 3.3. The weight of the loaded industrial truck plus any other material carried on the elevator shall not exceed the rated load when the industrial truck is also carried;
   - 3.4. During loading and unloading, the load on the elevator shall in no case exceed 150% of the rated load, and where this load exceeds the rated load, the capacity of the brake and the traction relation shall be adequate to safely sustain and level at least 150% of the rated load.

Note: When the entire rated load is placed on the elevator by the industrial truck in increments, the load imposed on the car platform while the last increment is being loaded or the first increment unloaded will exceed the rated load by the weight of the empty industrial truck.

3011.6.6.4 Capacity Plates.

1. Every elevator shall be equipped with a capacity plate or painted sign that is permanently and securely fastened in place and located in a conspicuous position inside the car. It shall indicate the rated load of the elevator in pounds, and for freight elevators, this plate or sign shall indicate:
   1.1. The capacity for lifting one-piece loads;
   1.2. For freight elevators used for industrial truck loading where the truck is not usually carried by the elevator but used only for loading and unloading, the maximum load the elevator is designed to support while being loaded or unloaded.
2. Capacity plates shall be durable and readily legible. The height of the letters and figures shall be at least 1/4 inch for passenger elevators and 1 inch for freight elevators.

3011.6.6.5 Signs on freight elevators. In addition to the capacity plate or painted sign on freight elevators, two other signs shall be installed or painted inside the car in a conspicuous place and permanently and securely fastened to the car enclosure. They shall be durable and easy to read with 1/2-inch letters, as follows:

1. In elevators not permitted to carry passengers, the sign shall read, “This is not a passenger elevator; no persons other than the operator and freight handlers are permitted to ride on this elevator.”
2. In elevators permitted to carry employees, the sign shall read, “No passengers except employees permitted.”

3011.6.7 Driving machines and sheaves.

3011.6.7.1 General requirements.

1. Sheaves and drums shall be made of cast iron or steel and shall have finished grooves for ropes.
2. Set screws fastenings shall not be used in lieu of keys or pins on connections subject to torque or tension.
3. Friction gearing or a clutch mechanism shall not be used to connect a driving-machine drum or sheave to the main driving mechanism, other than in connection with a car leveling device.

3011.6.7.2 Winding drum machines.

1. Winding drum machines shall be equipped with a slack-rope device with an enclosed switch of the manually reset type which shall cause the electric power to be removed from the elevator driving machine motor and brake if the hoisting ropes become slack or broken.
2. Winding drum machines shall be equipped with adjustable machine automatic terminal stop mechanisms set to directly open the main line circuit final terminal stopping switch. Chain, belt, or rope-driven mechanisms shall not be used.

3011.6.7.3 Indirect drive machines.

1. Indirect drive machines, utilizing V-belts, toot drive belts, or chain drives, shall have at least three belts or chains operating together in parallel as a set. Belt and chain drive sets shall be pre-loaded and matched for length.
2. Belt set selection shall be based upon the manufacturer’s rated breaking strength and a safety factor of 10. Chain and sprocket set selection shall be based upon the recommendations in the supplementary information section of ASME/ANSI B29.1, using a service factor of 2.0. Offset links in a chain are permitted. Chain drives and belt drives shall be guarded to protect against accidental contact and to prevent foreign objects from interfering with drives.

   Sprockets in a chain drive set and also in a driven set shall be assembled into a common hub, with the teeth cut in line after assembly to assure equal load distribution on all chains. Tooth sheaves for a belt drive shall be constructed in a manner to assure equal load distribution on each belt in the set.

   Load determination for both the belt and chain sets shall be based on the maximum static loading on the elevator car (full load on the car and the car at rest at a position in the hoistway which creates the greatest load, including either the car or counterweight resting on its buffer).
3. Each belt or chain in a set shall be continuously monitored by a broken belt or chain device of the manually reset type which shall function to automatically interrupt power to the machine and apply the brake in the event any belt or chain in the set breaks or becomes excessively slack. The driving machine brake shall be located on the traction sheave or winding drum assembly side of the driving machine so as to the fully effective in the event the entire belt set or chain set should break.
4. If one belt or chain of a set is worn, stretched, or damaged so as to require replacement the entire set shall be replace. Sprockets and toothed sheaves shall also be inspected on such occasion and replaced if noticeably worn.

3011.6.8 Driving machine brakes.

3011.6.8.1 Drive machine friction brakes. The drive machine shall be equipped with a friction brake applied by a spring or springs, and released electrically.

The brake shall be designed to have a capacity sufficient to hold the car at rest with its rated load. For passenger elevators and freight elevators permitted to carry employees, the brake shall be designed to hold the car at rest with an additional load up to 25% in excess of the rated load.

3011.6.8.2 Driving and release of driving machine brakes. Driving machine brakes shall not be electrically released until power has been applied to the driving machine motor. All power feed lines to the brake shall be opened and the brake shall apply automatically when:

1. The operating device of a car switch or continuous pressure operation elevator is in the stop position;
2. A floor stop device functions;
3. Any of the electrical protective devices in 3011.6.10.5 functions;

Under conditions described in subsection 1 and 2 of this section, the application of the brake may occur on or before the completion of the slowdown and leveling operations.

The brake shall not be permanently connected across the armature of field of a direct current elevator driving machine motor.

3011.6.9 Terminal stopping devices.

3011.6.9.1 Normal terminal stopping devices. Enclosed upper and lower normal terminal stopping devices shall be provided and arranged to slow down and stop the car automatically, at or near the top and bottom terminal landings. Such devices shall function independently of the operation of the normal stopping means and of the final terminal stopping device.

1. Normal stopping devices shall be located on the car, in the hoistway, or in the machine room or machinery space and shall be operated by the movement of the car.
2. Broken rope, tape, or chain switches shall be provided in connection with normal terminal stopping devices located in the machine room or machinery spaces of traction elevators. These switches shall be opened by a failure of the rope, tape, or chain and shall cause the electrical power to be removed from the driving machine motor and brake.

3011.6.9.2 Final terminal stopping devices. Enclosed upper and lower final terminal electro-mechanical stopping devices shall be provided and arranged to prevent movement of the car by the normal operating devices in either direction of travel after the car has passed a terminal landing. Final terminal stopping devices shall be located as follows:

1. Winding drum driving machines. Elevators having winding drum machines shall have stopping switches on the machines and also on the hoistway operated by the movement of the car.
2. Traction driving machines. Elevators having traction driving machines shall have stopping switches in the hoistway operated by the movement of the car.

3011.6.10 Operating devices and control equipment.

3011.6.10.1 Types of operating devices. The following types of operating devices shall not be used:

1. Rope (i.e., shipper rope);
2. Rod operating devices, actuated directly by hand; or
3. Rope operating devices actuated by wheels, levers, or cranks.

3011.6.10.2 Car-switch operation elevators. The handles of lever-type operating devices of car-switch operation elevators must be arranged so that they will return to the stop position and latch there automatically when the hand of the operator is removed.

3011.6.10.3 Passenger elevator emergency stop buttons. Where provided, elevator emergency stop buttons shall be connected to activate the elevator alarm when in the stop position. An optional door hold open switch may be provided, but such door hold open function shall automatically cancel upon activation of a Phase I recall.

3011.6.10.4 Top-of-car operating devices.

1. Elevators with automatic or continuous-operation shall have a continuous-pressure button operating switch mounted on the top of the car for the purpose of operating the car solely from the top of the car. The device shall operate the car at a speed not exceeding 150 fpm (0.76 m/s).
2. The means for transferring the control of the elevator to the top-of-car operating devices shall be on the car top and located between the car crosshead and the side of the car nearest the hoistway entrance normally used for access to the car top.
3. A top-of-car operating station shall be installed on all existing elevators which have more than fifteen feet of travel.

3011.6.10.5 Electrical protective devices. Electrical protective devices shall be provided in accordance with the following:

1. Slack-rope switch: Winding drum machines shall be accompanied by a slack-rope device equipped with a slack-rope switch of the enclosed manually reset type which will cause the electric power to be removed from the elevator driving machine motor and brake if the suspension ropes become slack.
2. Motor-generator running switch: Where generator-field control is used, means shall be provided to prevent the application of power to the elevator driving machine motor and brake unless the motor generator set connections are properly switched for the running condition of the elevator. It is not required that the electrical connections between the elevator driving machine motor and the generator be opened in order to removed power from the elevator motor.
3. Compensating rope sheave switch.: Compensating rope sheaves shall be provided with a compensating rope sheave switch or switches mechanically opened by the compensating rope sheave before it reaches its upper or lower limit of travel to cause the electric power to be removed from the elevator driving machine motor and brake.
4. Broken rope, tape or chain switches used in connection with machine room normal terminal stopping switches: Broken rope, tape or chain switches which meet the requirements of 3011.6.5.2 shall be provided in connection with normal terminal stopping devices located in machine rooms of traction elevators. These switches shall open when a rope, tape, or chain fails.
5. Stop switch on top-of-car: A stop switch shall be provided on the top of every elevator car, which shall cause the electric power to be removed from the elevator driving machine motor and brake, and shall:
   5.1. Be of the manually operated and closed type;
   5.2. Have red operating handles or buttons;
   5.3. Be conspicuously and permanently marked **"STOP"** and indicated the stop and run positions;
   5.4. Be positively opened mechanically (opening shall not be solely dependent on springs);
   5.5. Have red operating handles or buttons;
   5.6. Be conspicuously and permanently marked "stop';
   5.7. Indicate the "stop" and "run" positions; and
   5.8. Be positively opened mechanically and not solely dependent on springs.
6. Car-safety mechanism switch: A switch is required where a car safety is provided.
7. Speed governor overspeed switch: A speed governor overspeed switch shall be provided when required by 3011.6.5.2.
8. Final terminal stopping devices: Final terminal stopping devices shall be provided on every elevator.
9. Emergency terminal speed limiting device: Where reduced stroke oil buffers are provided, emergency terminal speed limiting devices are required.
10. Motor generator overspeed protection: Means shall be provided to cause the electric power to be removed automatically from the elevator driving machine motor and brake should a motor generator set, driven by a direct current motor, overspeed excessively.
11. Motor field sensing means: Where direct current is supplied to an armature and shunt field of an elevator driving machine motor, a motor field current sensing means shall be provided, which shall cause the electric power to be removed from the motor armature and brake unless current is lowering in the shunt field of the motor.

    A motor field current sensing means is not required for static control elevators provided with a device to detect an overspeed condition prior to, and independent of, the operation of the governor overspeed switch. This device shall cause power to be removed from the elevator driving machine motor armature and machine brake.
12. Buffer switches for oil buffers used with Type C car safeties: Oil level and compression switches shall be provided for all oil buffers used with Type C safeties.
13. Hoistway door interlocks or hoistway door electric contacts: Hoistway door interlocks or hoistway door electric contacts shall be provided for all elevators.
14. Car door/gate electric contacts: Car door or gate electric contacts shall be provided on all elevators.
15. Normal terminal stopping devices: Normal terminal stopping devices shall be provided on all elevators.
16. Car side emergency exit electric contacts: An electric contact shall be provided on every car side emergency exit door.
17. Electric contacts for hinged car platform sill: Hinged car platform sills, where provided, shall be equipped with electric contacts.
18. Stop switch in the elevator pit: A stop switch shall be installed in all elevator pits and shall be located adjacent to the normal pit access.

3011.6.10.6 Power supply line disconnecting means.

1. A disconnect switch or a circuit breaker shall be installed and connected into the power supply line to each elevator motor or motor generator set and controller. The power supply line shall be equipped with overcurrent protection inside the machine room or machinery space.
2. The disconnect switch or circuit breaker shall be of the manually closed multipole type and be visible from the elevator driving machine or motor generator set. When the disconnecting means is not within sight of the driving machine, the control panel, or the motor generator set, and additionally manually operated switch shall be installed adjacent to the remote equipment and connected in the control circuit to prevent starting.
3. No provision may be made to close the disconnect switch from any other part of the building.
4. Where there is more than one driving machine in a machine room, disconnect switches or circuit breakers shall be numbered to correspond to the number of the driving machine which they control.

3011.6.10.7 Phase reversal and failure protection. Elevators having polyphase alternating current power supply shall be equipped with a means to prevent the starting of the elevator motor if the phase rotation is in the wrong direction or if there is a failure of any phase.

This protection may be considered to be provided in the case of generator field control having alternating current motor-generator driving motors, provided a reversal of phase will not cause the elevator driving machine motor to operate in the wrong direction. Controllers on which switches are operated by polyphase torque motors provide inherent protection against phase reversal or failure.

3011.6.10.8 Grounding and overcurrent protections.

1. Control and operating circuit requirements shall comply with Article 621-61 of the 1990 Seattle Electrical Code.
2. Grounding methods shall comply with Articles 620-81 through 620-85 of the 1990 Seattle Electrical Code.

3011.6.10.9 Absorption of regenerated power. When a power source is used which, in itself, is incapable of absorbing the energy generated by an overhauling load, means for absorbing sufficient energy to prevent the elevator from attaining governor tripping speed or a speed in excess of 125% of rated speed, whichever is lesser, shall be provided on the load side of each elevator power supply line disconnecting means.

3011.6.10.10 Door bypass system. Door bypass systems, where used, shall conform with the requirements of ASME A17.1-1990 Rule 210.1e.

3011.6.10.11 Restricted opening of doors. All existing passenger elevators in Group R-1 hotels and dormitory buildings shall comply with the following. **

1. When a car is outside the unlocking zone, the hoistway doors or car doors shall be so arranged that the hoistway doors or car doors cannot be opened more than 4 inches (102 mm) from inside the car.
2. When the car doors are arranged that they cannot be opened when the car is outside the unlocking zone, the car doors shall be openable from outside the car without the use of special tools.
3. The doors shall be unlockable when the car is within 3 inches (76 mm) above or below the landing and are permitted to be configured to be unlockable up to 18 inches (457 mm) above or below the landing.

3011.6.11 Emergency operation and signaling devices.

3011.6.11.1 Car emergency devices in buildings. Where provided, elevators with an audible signaling device, operable from a switch or button marked “ALARM” which shall be located in or adjacent to each car operating panel. The signaling device shall be located inside the building and audible inside the car and outside the hoistway. One signaling device may be used for a group of elevators.

3011.6.12 Suspension systems and their connections.

3011.6.12.1 Suspension means. Cars shall be suspended by steel wire ropes attached to the car frame or passing around sheaves attached to the car frame. Only iron (low carbon steel) or steel wire ropes, having the commercial classification “elevator wire rope,” or wire rope specifically constructed for elevator used may be used for the suspension of elevator cars and for the suspension of counterweights. The wire material for ropes shall be manufactured by the open-hearth or electric furnace process or its equivalent.

3011.6.12.2 Rope data tag. At each rope renewal, a new metal tag shall be securely attached to one of the wire rope fastenings. Rope data tags shall be durable and readily legible. The height of letters and figures shall be no less than 1/16 inch. This data tag shall bear the following information:

1. The diameter in inches;
2. The manufacturer’s rated breaking strength;
3. The grade of material used;
4. The month and year the ropes were installed;

5. Whether non-preformed or preformed;
6. Construction classification;
7. Name of the person or firm that installed the ropes;
8. Name of the manufacturer of the ropes;
9. Number of ropes; and
10. The date on which the rope was re-socketed or other types of fastening changed.

3011.6.12.3 Factor of safety. The factor of safety of the suspension wire ropes shall not be less than shown on the following table. The factor of safety shall be based on the actual rope speed corresponding to the car's rated speed. The factor of safety shall be calculated by the following formula:

$$F = \frac{(S \times N)}{W} \qquad \textbf{(Formula 3011-1)}$$

where:

N = Number of runs of rope under load. (2:1 roping, twice the number of ropes used; 3:1 roping, three times, etc.).

S = Manufacturer's rated breaking strength of one rope.

W = Maximum static load imposed on all car ropes with the car and its rated load at any position in the hoistway.

TABLE 3011.6.12.3
Minimum Factors of Safety for Suspension Wire Ropes

Rope Speed (fpm)	Minimum Factor of Safety		Rope Speed (fpm)	Minimum Factor of Safety	
	Passenger	Freight		Passenger	Freight
50	7.60	6.65	605	10.85	9.65
75	7.75	6.85	700	11.00	9.80
100	7.95	7.00	750	11.15	9.90
125	8.10	7.15	800	11.25	10.00
150	2.25	7.30	850	11.35	10.10
175	8.40	7.45	900	11.45	10.15
200	8.60	7.65	950	11.50	10.20
225	8.75	7.75	1000	11.55	10.30
250	8.90	7.90	1050	11.65	10.35
300	9.20	8.20	1100	11.70	10.40
350	9.50	8.45	1150	11.75	10.45
400	9.75	8.70	1200	11.80	10.50
450	10.00	8.90	1250	11.80	10.50
500	10.25	9.15	1300	11.85	10.55
550	10.45	9.30	1350	11.85	10.55
600	10.70	8.50	1400-2000	11.90	10.55

3011.6.12.4 Minimum number and diameter of suspension ropes. All elevators, except freight elevators that do not carry passengers or freight handlers and have no means of operation in the car, shall conform to the following requirements:

1. The minimum number of hoisting ropes used is three for traction elevators and two for drum-type elevators. Where a car counterweight is used, the number of counterweight ropes used shall not be less than two.
2. The minimum diameter of hoisting and counterweight ropes is 3/8 inch (9.5 mm). Outer wires of the ropes shall be no less than 0.024 inch (0.61 mm) in diameter. The term "diameter" where used in this section refers to the nominal diameter as given by the rope manufacturer.

3011.6.12.5 Suspension rope equalizers. Suspension rope equalizers, where provided, shall be of the individual-compression spring type.

Equalizers of other types may be used with traction elevators provided the equalizers and fastenings are approved by the authority having jurisdiction on the basis of adequate tensile and fatigue tests made by a qualified laboratory. Such tests shall show the ultimate strength of the equalizer and its fastenings in its several parts and assembly, which shall be no less than 10% in excess of the strength of suspension ropes, provided that equalizers of the single-bar type, or springs in tension, shall not be used to attach suspension ropes to cars or counterweights or to dead-end hitch plates.

Exception: The requirements of this section do not apply to rope equalizers that meet rule 2.20.5 in ASME A17.1-2000/CSA B44:00.

3011.6.12.6 Securing of suspension wire ropes to winding drums. Suspension wire ropes of winding drum machines shall have the drum ends of the ropes secured on the inside of the drum by clamps or by tapered babbitted sockets, or by other means approved by the *building official.*

3011.6.12.7 Spare rope turns on winding drums. Suspension wire ropes of winding drum machines shall have not less than one turn of the rope on the drum when the car is resting on the fully compressed buffers.

3011.6.12.8 Suspension rope fastenings. Spliced eyes by return loop may continue in service. Suspension rope fastening shall conform to the requirements of ASME A17.1 Rule 212.9 1996 when the ropes are replaced.

3011.6.12.9. Auxiliary rope fastening devices. Auxiliary rope fastening devices, designed to support cars or counterweights if any regular rope fastenings fail, may be provided subject to approval by the *building official.*

[W] 3011.6.12.10 Compensating means. Compensating chains or ropes shall be fastened to the counterweight frame directly or to a bracket fastened to the frame and shall not be fastened to the tie rods.

3011.7 Hydraulic elevators.

3011.7.1 Scope. This section shall be the minimum standard for existing direct plunger and roped hydraulic elevators.

3011.7.1.1 All hoistways, hoistway enclosures, and related construction shall conform to the applicable requirements of Hoistways and Related Construction for Electric and Hydraulic Elevators. See Section 3011.5.

3011.7.1.2. Hydraulic elevators without safety bulkheads.

1. Oil levels shall be monitored and tracked in a log.
2. The log shall contain the date the oil was added, the reason for the loss of oil, and the amount of oil added.
3. If the reason for the loss of oil cannot be determined, the unit shall be immediately taken out of service and the tests specified in 8.6.5.14.1 and 8.6.5.14.2 ASME A17.1-2019/CSA B44:19 shall be performed.

3011.7.2 Mechanical equipment.

3011.7.2.1 Buffers and bumpers. Car buffers or bumpers shall be provided. Solid bumpers may be used in lieu of buffers where the rated speed is 50 fpm (0.25 m/s) or less.

3011.7.2.2 Car frames and platforms. Car frames and platforms shall conform to the requirements of 3011.6.2.

3011.7.2.3 Car enclosures. Car enclosures shall conform to the requirements of 3011.6.3.

3011.7.2.4 Capacity and loading. Capacity and loading shall conform to the requirements of 3011.6.6.

3011.7.3 Driving machines.

3011.7.3.1 Connection to driving machines. The driving member of a direct plunger driving machine shall be attached to the car frame or car platform with fastenings of sufficient strength to support that member.

The connection to the driving machine shall be capable of withstanding, without damage, any forces resulting from a plunger stop.

3011.7.3.2 Plunger stops. Plungers shall be provided with solid metal stops and/or other means to prevent the plunger from traveling beyond the limits of the cylinder. Stops shall be designed and constructed so as to stop the plunger from maximum speed in the up direction under full pressure without damage to the connection to the driving machine, plunger, plunger connection, or any other parts of the hydraulic system. For rated speeds exceeding 100 feet per minute where a solid metal stop is provided, means other than the normal terminal stopping device (i.e., emergency terminal speed limiting device) shall be provided to retard the car to 100 feet per minute with retardation no greater than gravity, before striking the stop.

3011.7.4 Valves, supply piping, and fittings.

3011.7.4.1 Pump relief valve.

1. Each pump or group of pumps shall be equipped with a relief valve conforming to the following specifications, except as covered by subsection (2) of this section:
   - 1.1. The relief valve shall be located between the pump and the check valve and shall be of such a type and installed in the by-pass connection so that the valve cannot be shut off from the hydraulic system.
   - 1.2. The relief valve shall be preset to open at a pressure no greater than 150% of working pressure.
   - 1.3. The size of the relief valve and bypass shall be sufficient to pass the maximum rated capacity of the pump without raising the pressure more than 25% above that at which the valve opens. Two or more relief valves may be used to obtain the required capacity.
   - 1.4. Relief valves having exposed pressure adjustments, if used, shall have their means of adjustment sealed after being set to the correct pressure.

2. No relief valve is required for centrifugal pumps driven by induction motors, provided the shutoff, or maximum pressure which the pump can develop, is not greater than 135% of the working pressure at the pump.

3011.7.4.2 Check valve. A check valve shall be provided and shall be so installed that it will hold the elevator car with rated load at any point when the pump stops, or the maintained pressure drops below the minimum operating pressure.

3011.7.4.3 Supply piping and fittings. Supply piping and fittings shall be in sound condition and secured in place.

3011.7.4.4 Flexible hydraulic connections. When flexible hydraulic connections are replaced, the requirements of ASME A17.1, Rule 303.1d 1996 shall be met in all respects. Where flexible connections pass through walls, the replacement shall be made with steel piping.

3011.7.5 Pressure tanks.

3011.7.5.1 General requirements.

1. Capacity. All tanks shall be of sufficient capacity to provide for an adequate liquid reserve to prevent the entrance of air or other gas into the system.
2. Minimal liquid level indicator. The permissible minimum liquid level shall be clearly indicated.

3011.7.5.2 Pressure tanks.

1. Vacuum relief valves. Tanks which may be subjected to vacuum sufficient to cause collapse shall be provided with one or more vacuum relief valves with openings of sufficient size to prevent collapse of the tank.
2. Gauge glasses. Tanks shall be provided with one or more gauge attached directly to the tank and equipped to shut off the liquid automatically in case of failure of the glass. The gauge glass or glasses shall be located so as to indicate any level of the liquid between permissible minimum and maximum levels and be equipped with a manual cock at the bottom of the lowest glass.
3. Pressure gauge. Tanks shall be provided with a pressure gauge which will indicate the pressure correctly to no less than 1-1/2 times the pressure setting of the relief valve. The gauge shall be connected to the tank or water column by pipe and fittings with a stop cock in such a manner that it cannot be shut off from the tank except by a stop cock. The stop cock shall have a “T” or level handle set in line with the direction of flow through the valve when open.
4. Inspector’s gauge connection. Tanks shall have a 1/4 inch pipe size valve connection for attaching an inspector’s pressure gauge when the tank is in service.
5. Liquid level detector. Tanks shall be equipped with a means to render the elevator inoperative if, for any reason, the liquid level in the tank falls below the permissible minimum.
6. Handholes and manholes. Tanks shall be equipped with means for internal inspection.
7. Piping and fittings for gauges. Piping and fittings for gauge glasses, relief valves, and pressure gauges shall be of a material that will not be corroded by the liquid used in the tank.

3011.7.6 Terminal stopping devices.

3011.7.6.1 Terminal stopping devices. Terminal stopping devices shall conform to the requirements of 3011.6.9.

3011.7.7 Operating devices and control equipment.

3011.7.7.1 Operating devices. Operating devices shall conform to the requirements of 3011.6.10.2.

3011.7.7.2 Top-of-car operating devices. Top-of-car operating devices shall be provided and shall conform to the requirements of 3011.6.10.1 and 3011.6.10.2, except for uncounterweighted elevators having a rise of no more than 15 feet.

3011.7.7.3 The bottom normal terminal stopping device may be made ineffective while the elevator is under control of the top-of-car operating system.

3011.7.7.4 Anti-creep leveling devices. Each elevator shall be provided with an anti-creep leveling device conforming to the following specifications:

1. It shall maintain the car within 3 inches of the landing regardless of the position of the hoistway door.
2. For electrohydraulic elevators, it shall operate the car only in the up direction.
3. For maintained pressure hydraulic elevators, it shall operate the car in both directions.
4. Its operation may depend on the availability of the electric power provided that:
   - 4.1. The power supply line disconnecting means required by 3011.6.10.6 is kept in the closed position at all times except during maintenance, repairs, and inspections.
   - 4.2. The electrical protective devices required by 3011.7.7.5 shall not cause the power to be removed from this device.

3011.7.7.5 Electrical protective devices. Electrical protective devices, if provided, shall conform with the requirements of 3011.6.10.5 and operate as follows:

1. The following devices shall prevent operation of the elevator by the normal operating device and also the movement of the car in response to the anti-creep leveling devices.
   1.1. Stop switches in the pit;
   1.2. Stop switches on top of the car; and
   1.3. Car side emergency exit door electric contacts, where such doors are provided.
2. The following devices shall prevent the operation of the elevator by the normal operating device but the anti-creep leveling device required by 3011.7.7.4 shall remain operative:
   2.1. Emergency stop switches in the car;
   2.2. Broken rope, tape, or chain switches on normal terminal stopping devices when such devices are located in the machine room, machinery space or overhead space;
   2.3. Hoistway door interlocks or hoistway door electric contacts;
   2.4. Car door or gate electric contacts; and
   2.5. Hinged car platform sill electric contacts.

3011.7.7.6 Power supply line disconnects. Power supply line disconnects shall conform to the requirements of 3011.6.10.6.

3011.7.7.7 Devices for making hoistway door interlocks or electric contacts, or car door or gate electric contacts inoperative. The installation shall conform to the requirements of 3011.6.3.5.

3011.7.7.8 Control and operating circuit requirements. Control and operating circuits shall conform to the requirements of 3011.6.3.6.

3011.7.7.9 Emergency operation and signaling devices. Emergency operation and signaling devices shall conform to the requirements of 3011.6.11.1.

3011.7.7.10 Additional requirements for counterweighted hydraulic elevators. Counterweighted hydraulic elevators shall be roped so that the counterweight shall not strike the overhead when the car is resting on its fully compressed buffer.

Where counterweights are provided, counterweight buffers shall be provided.

3011.7.7.11 Roped horizontal hydraulic elevators. Roped horizontal elevators are permitted to continue in service but once taken out of service shall not be reactivated. **

3011.8 Escalators. *

3011.8.1 Scope. This part is a minimum standard for all escalators used to transport passengers.

3011.8.2 Construction.

3011.8.2.1 Balustrades. The balustrade shall be totally closed except where the handrail enters the newel base. Gaps between interior panels are permitted provided that they are no wider than 3/16 inch (4.8 mm) and the edges are rounded or beveled.

3011.8.2.2 Clearance between skirt and step. The clearance on each side of the steps between the step tread and the adjacent skirt panel shall not be more than 3/16 inch (4.8 mm).

3011.8.2.3 Guards at ceiling or soffit intersections.

1. Guard required. A solid guard shall be provided in the intersection of the angle of the outside balustrade (deck board) and the ceiling or soffit, except as indicated in subsection (2) of this section. The vertical edge of the guard shall be a minimum of 8 inches. The escalator side of the vertical face of the guard shall be flush with the face of the wellway. The exposed edge of the guard shall be rounded and have a minimum width of 1/4 inch (6.4 mm).
2. Guards are not required under the following conditions:
   2.1. On high decks where the clearance of the outside edge of the deck and the ceiling or soffit is more than 12 inches (305 mm) or where the projected intersection of the outside deck and the ceiling or soffit is more than 24 inches (610 mm) from the centerline of the handrail.
   2.2. On low decks where the centerline of the handrail is more than 14 inches (356 mm) from the ceiling or soffit.

3011.8.2.4 Antislide device. On high deck balustrades, antislide devices shall be provided on decks or combination of decks when the outer edge of the deck is greater than 12 inches (305 mm) from the centerline of the handrail or on adjacent escalators when the distance between the centerline of the handrails is greater than 16 inches (406 mm).

These devices shall consist of raised objects fastened to the decks, not closer than 4 inches (102 mm) to the handrail and spaced not greater than 6 feet (1.83 m) apart. The height shall be no less than 3/4 inch (19 mm). There shall be no sharp corners or edges.

3011.8.2.5 Handrails. Each escalator shall be provided with a handrail moving in the same direction and at substantially the same speed as the steps.

3011.8.2.6 Handrail guards. Hand or finger guards shall be provided at the point where the handrail enters the balustrade.

3011.8.2.7 Slotting of step risers. Escalators with smooth curved surface risers shall have either:

1. Steps having cleated risers provided with vertical cleats which mesh with slots on the adjacent step tread as the steps make the transition from the incline to the horizontal; or
2. Means to cause the opening of the power circuits to the escalator driving machine motor and brake should a step be displaced against the upthrust track at the upper and lower curves in the passenger carrying line of the track system.

3011.8.2.8 Slotting of step treads. The tread surface of each step shall be slotted in a direction parallel to the travel of the steps.

3011.8.2.9 Combplates. There shall be a combplate at the entrance and at the exit of every escalator. The combplate teeth shall be meshed with and set into the slots in the tread surface so that the points of the teeth are always below the upper surface of the treads.

3011.8.3 Brakes.

3011.8.3.1 General requirements. Escalators shall be provided with a brake capable of stopping the up or down traveling escalator with any load up to brake rated load. The brake shall be mechanically or magnetically applied. If the brake is magnetically applied, a ceramic permanent magnet shall be used.

3011.8.3.2 Main drive shaft brake. If the escalator brake is separated from the main drive shaft by a chain used to connect the driving machine to the main drive shaft, a mechanically or magnetically applied brake capable of stopping a down running escalator with brake rated load shall be provided on the main drive shaft. If the brake is magnetically applied, a ceramic permanent magnet shall be used.

3011.8.4 Operating and safety devices.

3011.8.4.1 Starting switches. Starting switches shall be of the key-operated type and shall be located so that the escalator steps are within sight.

** **3011.8.4.2 Escalator starting switches.** “Up” and “Down” positions shall be clearly indicated on all starting switches.

3011.8.4.3 Emergency stop buttons. There shall be a red stop button in an accessible location at the top and bottom landings of each escalator. The operation either one of these buttons shall cause the interruption of power to the escalator. It shall be impossible to start an escalator by means of these buttons. These buttons shall be marked **“Escalator Stop Button.”**

3011.8.4.4 Speed governor.

1. A speed governor shall be provided, except as specified in subsection (2) of this section. Its operation shall cause the interruption of power to the driving machine if the speed of the steps exceeds a predetermined value, which shall be no more 40% above the rated speed.
2. The speed governor is not required where an alternating current squirrel induction motor is used and the motor is directly connected to the driving machine. (Note: The governor may be omitted in such case even though a chain is used to connect the sprocket on the driving machine to the sprocket on the main drive shaft.)

3011.8.4.5 Broken step-chain device. A broken step-chain device shall be provided to cause the interruption of power to the driving machine if a step chain breaks, and, where no automatic chain tension is provided, if excessive sag occurs in either step chain.

3011.8.4.6 Application of brake. The brake shall automatically stop the escalator when any of the safety devices function.

3011.8.4.7 Broken drive-chain device. When the driving machine is connected to the main drive shaft by a chain, a device shall be provided which will cause the application of the brake on the main drive shaft and also stop the drive machine if the drive chain parts.

3011.8.4.8 Skirt obstruction device. Means shall be provided to stop the escalator if an object becomes accidentally caught between the step and the skirt as the step approaches the upper or lower combplate. The device shall be located so that the escalator will stop before that object reaches the combplate.

3011.8.4.9 Rolling shutter device. Rolling shutters, if used, shall be equipped with a device which will be activated as the shutters begin to close to cause the opening of the power circuit to the escalator driving machine motor and brake.

3011.8.4.10 Reversal stop device. Means shall be provided to cause the opening of the power circuit to the driving machine motor and brake in case of accidental reversal of travel while the escalator is operating in the ascending direction.

3011.8.4.11 Tandem operation. Tandem operation escalators shall be electrically interlocked where traffic flow is such that bunching will occur if the escalator is carrying passengers away from the intermediate landing stops.

The electrical interlocks shall stop the escalator carrying passengers into the common intermediate landing if the escalator carrying passengers away from the landing stops. These escalators shall also be electronically interlocked to assure that thy run in the same direction.

3011.8.4.12 Caution signs. A sign shall be located at the top and bottom landings of each escalator, readily visible to the boarding passengers. The sign shall be of the standard design recognized by the elevator industry and include the following:

1. Caution;
2. Passenger Only;
3. Hold Handrail;
4. Attend Children; and
5. Avoid sides.

3011.8.5 Lighting of step treads.

3011.8.5.1 Lighting of step treads. Step treads shall be illuminated throughout. The light intensity on the treads shall not be less than 5 foot candles (54 lux).

The illumination shall be uniform intensity and shall not contrast materially with that of the surrounding area.

3011.8.5.2 Comb and step distinction. There shall be a visual contrast between the comb and step, achieved by color, pattern, or texture.

3011.8.5.3 Safety zone. The entry and exit zone shall be kept clear of all obstacles. The width of the zone shall be not less than the width between the centerlines of the handrails plus 8 inches. The length of the zone, measured from the end of the newel, shall be not less than twice the distance between the centerlines of the handrails.

Exception: On the entrance side, the safety zone distance may be reduced, when cart restriction devices are installed, with prior written permission from the *building official.*

3011.8.5.4 Landing access plates. Access plates at the top and bottom landings shall be properly located and securely fastened in place when no more than 70 lbf effort is required to open the access plate.

3011.9 Dumbwaiters, hand-powered dumbwaiters, and hand-powered elevators.

3011.9.1 Scope. This is a minimum standard for existing electric and hand-powered dumbwaiters and hand-powered elevators.

3011.9.2 Electric and electro-hydraulic dumbwaiters.

1. Dumbwaiter cars may be constructed of metal or wood and shall be in compliance with local ordinances as to fire resistance providing it is constructed to carry its rated load without distortion. The dumbwaiter car shall be fully enclosed except for the landing sides. The car floor shall not exceed 9 square feet in area, the total inside height shall not exceed 4 feet, and the maximum capacity shall not exceed 500 pounds.
2. Electrically operated machines shall be equipped with brakes that are electrically released and applied automatically by springs in conformity with the requirements set forth in 3011.6.8.1.
3. Dumbwaiters equipped with winding drum machines having a travel of more than 20 feet and a rated load of more than 100 pounds shall be equipped with a slack rope switch which will automatically remove the power from the motor and brake when the hoisting ropes become slack.

3011.9.3 Hand-power elevators and dumbwaiters.

1. Cars of hand-power elevators and dumbwaiters shall be enclosed on all sides not used for entrance. Elevator cars upon which an operator is permitted to ride shall have no more than one compartment.
2. Hand-powered elevators having a travel of more than 15 feet shall have a car safety capable of stopping and sustaining the car and rated load. The car safety device need not be operated by a speed governor and may be of the instantaneous type operated as a result of the breaking and slackening of the suspension members.
3. Hoistway doors for hand-powered elevators shall be designed so that they will ensure protection at each landing.
4. Doors for hand-powered dumbwaiters shall be designed so that they will ensure protection at all landings.
5. Every hoistway door, gate, or entrance of hand-powered elevators and hand-powered dumbwaiters shall have conspicuously displayed on the landing side in letters no less than 2 inches high, the words, “Danger – Elevator – Keep Closed” or “Danger – Dumbwaiter – Keep Closed.”

3011.9.4 Dumbwaiter machinery access. Access doors to dumbwaiter machinery spaces shall be provided with electric contacts and labeled on the exterior side “DANGER-DUMBWAITER” in one-inch letters. **

3011.10 Conveyance identification designation and labeling.

** **3011.10.1 Conveyance identification designation.** In any building with more than one elevator, dumbwaiter, escalators or other conveyances a designating numeric, or alphanumeric identification, at least two inches in height identifying each conveyance, shall be located at the main lobby entrance, inside the car, on the machine, on the governor if provided, and on the disconnect switch, or stop switch, in the elevator pit, and if the conveyance has a walk-in pit, the buffer stands and on escalator upper and lower front plates.

** **3011.10.2 Conveyance labeling.** All equipment (disconnect switches, machines, and controllers) operating on a voltage in excess of 250 volts shall be labeled for the voltage used in letterings 3/4 inches high.

3011.11 Requirements for all conveyances for repairs, maintenance, alterations, testing, and periodic inspection.

3011.11.1 Repairs, maintenance, alterations, testing, and periodic inspections. Repairs, maintenance, alterations, testing, and periodic inspections shall be performed in accordance with ASME A17.1/CSA B44 Sections, 8.6, 8.7, 8.10 and 8.11.

3011.11.1.1 Firefighters' emergency operation quarterly testing. Firefighters' emergency operation quarterly testing requirements and documentation see 3028.5.

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SECTION 3012
RETROACTIVE REQUIREMENTS FOR EXISTING MATERIAL LIFTS

3012.1 General. Existing material lifts shall be made to comply with the following requirements. (Note: New material lifts shall comply with Section 3013).

3012.2 Hoistway enclosure gates and doors. The openings at each material lift landing shall have gates or doors that guard the full width of the opening. A hoistway door shall be vertically sliding, bi-parting, counter-balanced, or horizontally swinging or sliding. Gates and doors shall meet the following requirements:

1. A balanced-type, vertically sliding hoistway gate shall extend from not more than 2 inches from the landing threshold to not less than 66 inches above the landing threshold.
2. A gate shall be solid or openwork of a design that will reject a ball 2 inches in diameter. A gate shall be located so that the distance from the hoistway face of the gate to the hoistway edge of the landing sill is not more than 2-1/2 inches. A gate shall be designed and guided so that it will withstand a lateral pressure of one hundred pounds applied at approximately its center without breaking or being permanently deformed and without displacing the gate from its guides or tracks.
3. Hoistway gates or doors shall have a combination mechanical lock and electric contact, which shall prevent operation of the material lift by the normal operating devices unless the door or gate is closed.

3012.3 Controls.

1. The control station shall be remotely mounted so that it is inaccessible from the material lift car.
2. Controls shall be clearly marked or labeled to indicate the function of control.
3. All control stations shall have a stop switch. When opened, the stop switch shall remove the electrical power from the driving machine and brake. The stop switch shall:
   - 3.1. Be manually operated;
   - 3.2. Have red operating handles or buttons;
   - 3.3. Be conspicuously and permanently marked "STOP";
   - 3.4. Indicate the stop and run positions; and
   - 3.5. Be arranged to be locked in the open position.

3012.4 Capacity posting and no-riders sign. Each material lift shall have a capacity sign permanently and securely fastened in place in the material lift car and on the landings. The sign shall indicate the rated load of the material lift in pounds. The sign shall be metal with black letters two inches high on yellow background.

A sign stating "NO PERSONS PERMITTED TO RIDE THIS DEVICE" shall be conspicuously and securely posted on the landing side of all hoistway gates and doors and in the enclosure of each material lift car. The sign shall be metal with black letters 2 inches high on red background.

SECTION 3013
REQUIREMENTS FOR NEW MATERIAL LIFTS

[W] 3013.1 All new material lifts. All new material lifts and standard application material lifts, as defined in Section 3004, shall comply with ASME A17.1, Sections 2.7, 2.8 and 3.7 and with one of the following:

1. WAC 296-96 Part C1, Standard Application Material Lifts, or
2. ASME A17.1/CSA B44, Material Lifts 7.4, 7.5, or 7.6.

SECTION 3014
EMERGENCY SERVICE FOR ELEVATORS IN EXISTING BUILDINGS - PHASE I RECALL

3014.1 General. All existing elevators requiring Phase I recall when installed or under Chapter 93 of the *Seattle Fire Code* shall comply with this section.

Exceptions:

1. Elevators that comply with the standards for new installations provided in Section 3018;
2. Elevators with less than 25 feet of travel if the *building official* and the *fire code official* give written approval; and
3. Elevators that comply with ASME A17.1, Rule 211.3a 1984 edition or later and Sections 3014.10 and 3014.11.

3014.2 Phase I recall keyed switch. A three-position ("on," "off" and "bypass") key cylinder switch shall be provided at each designated level within easy line of sight of the elevator controlled by the switch. If additional switches are provided in a central control station they shall be two position ("off" and "on") key-operated switches.

3014.3 Keyed cylinder-type switches. Keyed cylinder-type switches shall comply with the following:

1. Keys shall be removable only in the emergency ("on") and normal ("off") positions. Keys shall not be removable in the by-pass position.
2. One key shall be provided for each Phase I switch or key cylinder.
3. All emergency operation cylinders (Phases I and II) shall be keyed alike but such key shall not be a part of a building master key system.

3014.4 Key location.

1. A key box meeting the standards of Section 3011.3 shall be provided at the designated recall floor above the Phase I recall switch. The key box is to be mounted approximately 6 feet above the floor. The *building official* is permitted to approve other locations upon request.
2. When a central control station is provided, an additional set of keys shall be provided and hung in the control station in a location designated by the fire chief. The keys shall be identified by a ring or paddle.

3014.5 Key switch functions.

1. The three positions of the switch shall be marked "bypass," "off" and "on."
2. If the switch is in the "off" position, normal elevator service shall be provided and smoke detectors, if required, shall be functional.
3. If the switch is in the "bypass" position, normal elevator service shall be restored independent of any required smoke detectors.
4. If the switch is in the "on" position, the elevators are in Phase I elevator recall mode.

3014.6 Phase I automatic recall operation. If the Phase I recall switch is in the emergency ("on") position:

1. All cars controlled by this switch that are on automatic service shall return nonstop to the designated level and power-operated doors shall open and remain open.
2. A car traveling away from the designated level shall reverse at or before the next available floor without opening its doors.
3. A car stopped at a landing shall have the in-car emergency stop switch or in-car stop switch rendered inoperative as soon as the doors are closed, and the car starts toward the designated level. A moving car, traveling to or away from the designated level, shall have the in-car emergency stop or in-car stop switch rendered inoperative immediately.
4. A car standing at a floor other than the designated level, with doors open and in-car emergency stop switch or in-car stop switch in the run position, shall conform to the following:
   - 4.1. Elevators having automatic power-operated horizontally sliding doors shall close the doors without delay and proceed to the designated level;
   - 4.2. Elevators having power-operated vertically sliding doors provided with automatic or momentary pressure closing operation in accordance with ASME A17.1 Rule 112.3d 1984 or later edition shall have the closing sequence initiated without delay in accordance with ASME A17.1 Rule 112.3d (1), (2), (3), and (5) 1984 or later edition, and the car shall proceed to the designated level;
   - 4.3. Elevators having power-operated doors provided with continuous pressure closing operation per ASME A17.1 Rule 112.3b 1984 or later edition or elevators having manual doors shall conform to the requirements of Section 3014.7. Sequence operation, if provided, shall remain effective
5. Door reopening devices for power-operated doors that are sensitive to smoke or flame shall be rendered inoperative. Mechanically actuated door reopening devices not sensitive to smoke or flame shall remain operative. Car door open buttons shall remain operative. Door closing shall conform to the requirements of ASME A17.1 Rule 112.5 1984 or later edition. Door hold open switches shall be rendered inoperative.

6. All car and corridor call buttons and all corridor door opening and closing buttons shall be rendered inoperative. All call register lights, and directional lanterns shall be extinguished and remain inoperative. Position indicators, if provided, shall remain in service. All prior registered calls shall be canceled.
7. The activation of a smoke detector installed in accordance with Article 93 of the Seattle Fire Code in any elevator lobby or associated elevator machine room, other than the designated level, shall cause all cars in all groups that serve that lobby to return nonstop to the designated level. The fire code official is permitted to approve the connection of other detection devices to activate recall. The operation shall conform to the requirements of Phase I emergency recall operation. Whenever new elevator controllers are installed, they shall meet all provisions of the then current building and elevator codes. Newly installed controllers shall have the capability of selecting alternate recall floors.

3014.7 Attendant-operated recall operation. Attendant-operated elevators shall be provided with visible and audible signals that alert the operator to return to the lobby when the car has been recalled under Phase I control.

3014.8 Dual recall operation. Elevators arranged for dual operation shall conform to all requirements for automatic operation and attendant operation as applicable.

3014.9 Inspection/maintenance recall operation. During inspection operation the audible and visible signals required in Section 3014.7 will be actuated when the car has been recalled under Phase I control. The car shall remain under the control of the operator and/or car top station until the car is returned to service.

3014.10 Nurses' preemption. Nurses' preemption (hospital service) is permitted to commandeer up to one-half of the cars in a particular bank of elevators. At least one-half of the cars shall respond to Phase I and all cars not preempted shall respond.

3014.11 Operation instruction. Instructions for operation of elevators under Phase I shall be incorporated with or adjacent to the Phase I switch at the designated level. Instructions for operation of elevators under Phase II shall be incorporated with or adjacent to the switch, in or adjacent to the operating panel in each car. In addition, Phase I operating instructions shall be adjacent to the Phase I switch in the fire control center and other *approved* locations.

Instructions shall be in letters not less than 1/8 inch (3.2 mm) in height and shall be permanently installed and protected against removal or defacement.

3014.12 Latching. All cars responding to Phase I Recall, activated by a smoke detector or other *approved* detection device, shall return to the appropriate recall floor as determined by the first detector recall signal received. No device other than the Phase I switch is permitted to override the first recall signal received. A later detection signal shall not change the recall floor. Smoke detector activation shall only be reset manually.

SECTION 3015
EMERGENCY SERVICE FOR ELEVATORS IN EXISTING BUILDINGS – PHASE II HIGH RISE IN-CAR OPERATION

3015.1 General. Existing elevators in buildings having floors used for human occupancy located more than 75 feet above the lowest level of fire department vehicle access, or buildings having floors used for human occupancy 35 feet above grade, which lack fire department vehicle access to at least one side shall have Phase II in-car operation and shall comply with this section.

Exceptions:

1. Elevators that comply with the standards for new installations as provided in Section 3019;
2. Elevators with less than 25 feet of travel when the *building official* and *fire code official* give written approval; and
3. Elevators that comply with ASME A17.1 Rule 211.3c 1984 or later edition.

3015.2 Phase II in-car operation key switch.

1. A two-position ("off" and "on") key cylinder switch shall be provided in each elevator car.
2. The switch shall become effective only when the designated level Phase I switch is in the "on" position or a smoke detector has been activated and the car has returned to the designated level. The "on" position shall place the elevator in Phase II in-car operation.
3. The elevator shall be removed from Phase II operation only by moving the switch to the "off" position with the car at the designated level.
4. The switch shall be operable by the Phase I key and such key shall not be part of a building's master key system.
5. The key shall be removable only in the "off" position.
6. One key shall be provided for each Phase II switch or key cylinder.

3015.3 Key location. See Section 3014.4 for the location of the keys.

3015.4 Designated operator. The operation of elevators on Phase II emergency in-car operation shall be by trained emergency service personnel only.

3015.5 Car operation only. An elevator shall be operable only by a person in the car.

3015.6 Corridor call buttons and directional lanterns. All corridor call buttons, and directional lanterns shall remain inoperative.

3015.7 Car and Hoistway Door Operation. The operation of car and hoistway doors shall comply with the following:

1. The opening of power-operated doors shall be controlled only by constant-pressure open buttons or switches.
2. If the constant-pressure open button or switch is released prior to the doors reaching the fully open position, the doors shall automatically reclose. Once doors are fully open, they shall remain open until signaled to close.
3. The closing of power-operated doors shall be by constant pressure of either the call button or door-close button. If a door-close button is supplied, it shall be operable.
4. If the constant-pressure close button or car call button is released prior to the doors reaching the fully closed position, the doors shall automatically reopen. Once doors are fully closed, they shall remain closed until signaled to open.

   Exception: Momentary pressure control of doors using the sill trip-type operator may be permitted as existing; however, the doors shall not open automatically upon arrival at a floor.

3015.8 Door reopening devices. Smoke-sensitive door reopening devices and door hold-open switches shall be rendered inoperative. Non-smoke-sensitive door reopening devices required to be operative under all other conditions may be rendered inoperative under Phase II in-car operation only if the doors are closed by constant pressure.

3015.9 Car call cancellation. All registered calls shall cancel at the first stop.

3015.10 Direction of travel. Direction of travel and start shall be by the car call buttons. With doors in the closed position, actuation of the car call button shall select the floor and start the car to the selected floor. If no door-close button is available, constant pressure of the car call button shall select the floor, close the door, and start the car to the selected floor.

Exception: On proximity-type car call buttons or any other type subject to false firing (calls being placed by line spikes, intermittent loss of power, etc.), the doors shall be closed by a door-close button. Floors may be selected either before or after closing of the doors. The car will start only on the call button or door close button depending on which is the last device to be actuated.

3015.11 Motor generator time out. The motor generator shall not time out automatically.

3015.12 Car position indicators. The car position indicators, when provided, shall be operative.

3015.13 Phase II priority. Phase II operation shall override any floor calls keyed out for security reasons. Floor selection buttons shall be provided in the car to permit travel to all floors served by the car. Means that prevent the operation of these buttons shall be rendered inoperative.

3015.14 False starts. The elevator shall not start if no calls registered.

3015.15 Terminal runs. The elevator shall not make unprogrammed terminal runs.

3015.16 Loss of power. Elevators on fire emergency Phase II car operation shall remain in their respective locations and in Phase II mode upon loss of power. They shall not move unless the elevator is under the control of the operator and power has been restored.

SECTION 3016
NEW INSTALLATIONS - CONSTRUCTION STANDARDS

3016.1 General. All new elevators, escalators, moving walks, dumbwaiters and other conveyances and their installation shall conform to the requirements of ASME A17.1/CSA B44 as amended by this chapter.

3016.2 Wall covering material for passenger cars. Wall covering material for passenger cars shall comply with the following:

1. ASME A17.1/CSA B44 Section 2.14.
2. *Seattle Building Code* requirements concerning flame spread ratings for wall coverings and use of plastics. (See Chapter 8.)

3016.3 Seismic considerations. New installations shall comply with ASME A17.1/CSA B44 Section 8.4. The provisions for Seismic Design Category D shall apply.

3016.4 Accessibility. All new passenger elevators required to be accessible or to serve as part of an *accessible* means of egress shall comply with Sections 1009, 1109.7, and ICC A117.1.

[W] 3016.5 Handrails. Handrails in elevator cabs are not required. Where handrails are provided in elevator cars, their configuration shall comply with ICC A117.1.

3016.6 Emergency elevator communication systems for the deaf, hard of hearing and speech impaired. An emergency two-way communication system shall be provided that:

1. Is a visual and text-based and a video-based 24/7 live interactive system.
2. Is fully accessible by the deaf, hard of hearing and speech impaired, and shall include voice-only options for hearing individuals.

3. Has the ability to communicate with emergency personnel utilizing existing video conferencing technology, chat/text software or other approved technology.
4. Conform with ASME A17.1, 2.27.1.

Exception: Private residence elevators are not required to comply with this section.

[W] 3016.7 Inclined stairway chairlifts.

3016.7.1 Inclined commercial stairway chairlifts. Governor overspeed testing shall be verified by manufacturer documentation.

3016.7.2 Private residence inclined stairway chairlifts. Battery operated private residence include stairway chairlifts are not required to be permanently wired or installed on an individual branch circuit as required by NEC 620.51 (A) Exception 2. These conveyances shall be permitted to use a cord and plug that will act as the equipment disconnecting means. The circuit which is used for the equipment shall have overcurrent protection that will protect the circuit and the equipment. The circuit shall have sufficient capacity to support the additional load of the stairway chairlift. Units that are operated by line voltage shall comply with NEC 620.51 (A) Exception 2.

A free passage width of not less than seventeen inches shall be provided. IF the chair can be folded when not in use the distance can be measured from the folded chair. When in use there shall be a minimum of two inches between any body part and the nearest obstruction.

3016.8 Hoistway pressurization. The requirements of Section 3016.8 apply in addition to ASME A17.1/CSA B44, 2.1.4 and Section 713.14.

Note: See Section 909.21, Elevator hoistway pressurization alternative for other requirements.

1. When pressurization is installed in elevator hoistways, the pressurization of the hoistway shall be measured with all elevator systems in recall mode, Phase I, and all cars at the designated recall level with the doors in the open position.
2. Activation of the fan serving the hoistway pressurization system may be delayed by up to 30 seconds so that elevator recall can be initiated prior to pressurizing the hoistway.
3. Unless specifically installed to serve that space only, environmental air systems and pressurization systems shall not be located in hoistways, elevator mechanical rooms and elevator machinery spaces.

   Exceptions:

   1. Pressurization ducts serving a hoistway that are separated from the room or space by construction equal to the rated construction of the room or space and so located that all required clearances are maintained.
   2. Pressurization duct openings, dampers and grilles are permitted to be located in hoistway shaft walls if the pressurization air does not impair the operation of the elevator.
   3. Hoistways shall not be pressurized through pressurization of elevator control rooms or machine rooms. The machine room floor between the hoistway and overhead control rooms or machine room shall contain as few penetrations as possible. All penetrations for cable drops, etc., shall be held to a minimum size.
   4. Elevator doors shall operate properly when hoistway pressurization is in effect.
   5. Ventilation louver operating motors shall not infringe on any elevator machinery or controller working clearances.

3016.9 Elevator operation on emergency power. All elevators required to be supplied with emergency power shall comply with the following:

1. Each elevator shall be transferable to the emergency power supply system.
2. Emergency power supply systems capable of handling all elevators on the premises need no sequencing or switching other than the possibility of staggering the restarting of the generators.
3. Emergency power supply systems, whose capacity can only handle one elevator of a duplex or one elevator in each elevator group, shall comply with the following.

   3.1. All elevators on automatic operation shall be automatically assigned emergency power in sequence and returned to the Phase I recall or lobby floor, where they shall open their doors and then time out of service.

   3.2. The last car down will generally be the selected car of a duplex or an elevator group to remain in service. The service shall continue to be automatic.

   3.3. The assignment of emergency power will skip or rotate past cars that are out of service (emergency stop switch pulled, malfunction, car top operation, etc.). If assignment is made to a manual or attendant-operated car and the car is unattended, the system shall rotate past the car as though it is out of service.
4. The lights for the car, control room, machine room and machine space shall be activated on the emergency system.
5. A manual emergency power assignment switch or switches shall be in an elevator status panel located in the fire department central control station. Each elevator shall be capable of being assigned emergency power from this location. The

manual switching shall be effective at all times other than when the cars are automatically sequencing to the lobby or when the selected car is traveling. The switch shall not remove power in midflight or with doors closed

6. Elevators on Phase II car operation shall remain in their respective locations upon loss of power. They shall remain in Phase II mode and shall not move unless the elevator is under the control of the operator and normal power has been restored or emergency power has been assigned to the car by either automatic or manual means.
7. Loss of power and initiation of emergency power immediately after Phase I recall operation has occurred shall not cause any cars to be stranded in the building. Upon the application of emergency power to the equipment, the cars shall follow the normal sequencing to the lobby, open their doors and time out of service. When all cars have been bypassed (out of service) or returned to the lobby, the assigned car shall then become available for firefighter's use on Phase II in-car operation.
8. Each elevator operating on emergency power shall be tested in accordance with applicable ASME A17.1/CSA B44, 2.16.8, 2.26.10 and 2.27.2, and ASME A17.2 2017, Part 6.
9. If the elevator cars are recalled to the alternate floor by Phase I recall and a loss of power occurs, the cars shall be sequenced to the alternate floor upon assignment of emergency power. The cars shall not go to the primary designated recall floor under these conditions. The alternate floor shall be provided with a means of identifying the elevator that is supplied with emergency power.
10. The elevator position indicator system, if provided, shall not become disoriented due to the loss of power or any other reason. However, upon the resumption of power, the car may move to reestablish absolute car position.
11. Communications to the car shall remain in service and shall be tested in accordance with applicable ASME A17.1/CSA B44, 2.27.1.

3016.10 Multiple hoistways. The number of elevators permissible in a hoistway is as follows. See ASME A17.1/CSA B44, 2.1.1.4.

1. No more than four elevators shall be in a single hoistway.
2. No more than three elevators serving all or the same portion of a building are permitted to be in a single hoistway.

   Exception: Four elevators serving all or the same portions of a building are permitted to be in a common hoistway under the following conditions:

   1. The hoistway is pressurized; and
   2. Emergency generator power is available to serve both the elevators and pressurization equipment.

3016.11 Additional doors. Doors other than the hoistway door and the elevator car door are prohibited at the point of access to an elevator car except in accordance with applicable provisions in ASME A17.1/CSA B44, 2.11.6.

3016.12 Knox box 1400 series key retainer box. A key retainer box that meets the requirements of this section shall be provided.

1. The box shall be locked and keyed to the secure city access key for elevator and other conveyance access and operation keys.
2. The box shall be located at the designated recall floor above the Phase I recall switch or in the main lobby above the hall call button if no recall feature exists.
3. The box shall be flush or surface mounted approximately 6 feet above the floor.
4. The box shall be attached to the building so as to be able to withstand a force of 300 psf applied horizontally at any point.
5. The box shall be large enough to accommodate all required keys.
6. The box shall be labeled "For Emergency Use."
7. The lock shall be high security Medeco lock specified by the building official.
8. The *building official* may approve other locations and custom box types upon request.

Key retainer boxes for accessibility lifts are permitted to comply with Section 3011.3.1 or 3011.3.2 as an alternative to complying with this section.

3016.13 Elevator access keys. Keys for access to and for the operation of elevator and other conveyance equipment shall tagged and retained in the key retainer box. The key retainer box shall contain fire emergency service keys (Phase I and II, one key for each switch) and keys to all of the following that are in the building:

1. Doors to the control room, machine room and machine space;
2. Doors preceding elevator control room, machine room, and machine space,
3. Secondary level door;
4. Pit door;
5. Roof door;

6. Independent, hospital emergency and attendant operation;
7. Hoistway access;
8. Mechanical hoistway access devices (broken arm, lunar, etc.);
9. Lighting and fan;
10. Fob or card reader for secured car calls and or hall call buttons;
11. Miscellaneous switch keys;
12. Fire alarm panel room;
13. Sprinkler valve control room;
14. Fire command center;
15. Elevator central control station panel and fire command center.

3016.14 Escalator and moving walk conveyance number designation. In any building with more than one escalator or moving walk, a designating numeric or alphanumeric number, at least two inches in height shall be located on the upper and lower front plates.

[W] 3016.15 Elevator car to accommodate ambulance stretcher. In buildings provided with an elevator, at least one elevator shall provide fire department emergency access to all floors served in:

1. Buildings four or more *stories* above or below *grade plane,* and
2. Any R-1, R-2 or I occupancy building regardless of the number of *stories.*

The elevator car shall be of a size and arrangement to accommodate a 24-inch by 84-inch (610 mm by 2134 mm) ambulance stretcher with not less than 5-inch (127 mm) radius corners, in the horizontal, open position. The elevator shall be identified by the international symbol for emergency medical services (star of life). The symbol shall not be less than 3 inches (76 mm) in height and shall be placed inside on both sides of the hoistway door frame on both the designated level and the alternate level.

Exception: Private residence elevators are not required to comply with this section.

Note: The stretcher-sized elevator car may also serve as an *accessible means of egress* as required by Section 1009.2.1 of the *Seattle Building Code.*

3016.16 Signs. A sign complying with ASME A17.1/CSA B44, 2.27.9 shall be posted in the elevator lobby of every elevator equipped for firefighters' emergency operation. The signs shall be located above each hall call fixture noting that the elevators will be recalled to the building lobby on fire alarm.

Exception: If *approved* by the *building official,* signs need not be posted in lobbies at the main egress level if the means of egress are obviously identifiable.

A sign indicating a designating numeric or alphanumeric number of each elevator shall be posted and maintained in the elevator lobby at the designated recall level and at alternate recall floors, if provided.

3016.17 Fire service access elevators and occupant evacuation elevators. See Section 403 and ASME A17.1/CSA B44 for provisions related to fire service access elevators and occupant evacuation elevators.

3016.18 Energy efficiency. Elevator systems shall comply with the *Seattle Energy Code.*

Note: The *Seattle Energy Code* includes the following provisions for energy efficiency of elevators and escalators:

C405.9.1 Elevator cabs. For the luminaires in each elevator cab, not including signals and displays, the sum of the lumens divided by the sum of the watts shall be no less than 35 lumens per watt. Ventilation fans in elevators that do not have their own air conditioning system shall not consume more than 0.33 watts/cfm at the maximum rated speed of the fan. Controls shall be provided that will de-energize ventilation fans and lighting systems when the elevator is stopped, unoccupied and with its doors closed for over 15 minutes. accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers.

C405.9.2 Escalators and moving walks. Escalators and moving walks shall comply with ASME A17.1/ CSA B44 and shall have automatic controls configured to reduce speed to the minimum permitted speed in

Exception: A power factor controller that reduces operating voltage in response to light loading conditions ((~~may~~)) is permitted to be provided in lieu of the variable speed function.

C405.9.3 Regenerative drive. An escalator designed either for one-way down operation only or for reversible split shall have a variable frequency regenerative drive that supplies electrical energy to the building electrical system when the escalator is loaded with passengers whose combined weight exceeds 750 pounds.

3016.19 Elevator landing illumination. Elevators shall comply with ASME A17.1/CSA B44, 2.11.10.2 Illumination at Landing Sills, as amended below.

ASME 2.11.10.2 Illumination at Landing Sills. The building corridors shall be so lighted that the illumination at the landing sills, when an elevator is in service, shall be not less than 100 lx (10 fc). Illumination under emergency power shall comply with Section 1008.

SECTION 3017
NEW INSTALLATIONS – GENERAL EMERGENCY OPERATION REQUIREMENTS

3017.1 General. All elevators shall conform to the requirements of this section and the specific requirements of Sections 3018, 3019, and ASME A17.1/CSA B 44, 2.27.2.

3017.2 Central control stations or Fire Command Center. The following criteria shall be met if buildings provide a central control station or fire command center in accordance with Section 911:

1. An additional two-position ("off" and "on") Phase I recall switch for each elevator or elevator group shall be installed when the control station is not within easy line of sight of the lobby Phase I recall switches; the switch(es) shall be rotated clockwise to go from "off" to "on" positions;
2. A car position indicator shall be permanently installed, which shall be of a positive type that will not lose the car position nor need resetting on loss of power. Reading of the indicator shall not require special knowledge;
3. Firefighter's phone jacks shall be provided that allow each elevator car to be connected to the fire control center;

   Exception: Fire department radio systems may be provided in lieu of phone jacks if approved by the fire department.
4. A manual emergency power assignment switch;
5. A Phase I indicator;
6. A Phase II indicator.

3017.3 Nurses' preemption. Nurses' preemption (hospital service) may be allowed to commandeer up to one-half of the cars in a particular bank of elevators. At least one-half of the cars shall respond to Phase I and all cars not preempted shall respond.

3017.4 Phase I and II operation instructions. Operation instructions shall be available in accordance with ASME A17.1/CSA B44, 2.27.7. In addition, Phase I operating instructions shall be adjacent to the Phase I switch in the fire command center and other *approved* locations. The Phase II operation instructions shall identify the location of the elevator machine rooms and control rooms.

3017.5 Fireman's visual signal, ASME A17.1/CSA B44, 2.27.3.2.6. Elevators requiring Phase I or Phase II operation shall comply with ASME 2.27.3.2.6 as amended below:

When ((~~Phase I Emergency Recall Operation is initiated by a fire alarm initiating device~~)) a smoke or heat detector for any location listed in 2.27.3.2.6(a) through (e) ((~~,~~)) is activated during Phase I Emergency Recall Operation as required by 2.27.3.2.3 or 2.27.3.2.4, or Phase II Emergency In-Car Operation as required by 2.27.3.3, the visual signal [see 2.27.3.1.6(h) and Fig. 2.27.3.1.6(h)] shall illuminate intermittently only in a car(s) with equipment in that location, as follows:

(a) machine room

(b) machinery space containing a ((~~motor controller~~)) driving machine

(c) control room

((~~(d) control space~~))

(e) hoistway

SECTION 3018
NEW INSTALLATIONS – PHASE I

3018.1 Phase I recall requirements.

3018.1.1 ASME A17.1, 2.27.3 General. ASME A17.1/CSA B44, 2.27.3, Firefighters' Emergency Operation: Automatic Elevators, is superseded by the following.

Phase I emergency recall operation shall be provided for all elevators with fully automatic open and close power- operated doors.

3018.1.2 ASME A17.1, 2.27.3.1 Phase I emergency recall operation. Elevators requiring Phase I recall emergency operation shall comply with ASME A17.1/CSA B44, 2.27.3.1 Phase I Emergency Recall Operation, and the following:

Elevator groups containing four or more cars shall be provided with two, three-position key switches per group. Two-position ("off" and "on") switches shall be provided in the fire command center if this code requires such a center. The switch(es) shall be rotated clockwise to go from "off" to "on" position. Hall call buttons common to an elevator group shall remain in service unless both Phase I recall switches of a four-car or larger group are placed in the recall mode, or a fire alarm recall signal is initiated.

Note: See 3028.5 for Phase I and Phase II quarterly testing requirements.

Note: For occupant evacuation elevators see ASME/CSA B44, 2.27.11.

SECTION 3019
NEW INSTALLATIONS – PHASE II IN-CAR REQUIREMENTS

3019.1 Phase II In-car Operation. Elevators requiring Phase II in-car operation shall comply with ASME A17.1/CSA B44, 2.27.8 Switch Keys, as amended below.

ASME 2.27.8 Switch Keys. The key switches required by 2.27.2 through 2.27.5, and 2.27.11 for all elevators in a building shall be operable by the FEO-K1 key. The keys shall be Group 3 Security (see 8.1). A separate key shall be provided for each switch. These keys shall be kept in the key retainer box required by Section 3016.12 or 3016.19. ((~~on the premises in a location readily accessible to firefighters and emergency personnel, but not where they are available to the public.~~)) This key shall be of a tubular, 7 pin, style 137 construction and shall have a bitting of 6143521 starting at the tab sequenced clockwise as viewed from the barrel end of the key; cutting depths shall be in accordance with Fig. 2.27.8. The key shall be coded "FEO-K1." The possession of the "FEO-K1" key shall be limited to elevator personnel, emergency personnel, elevator equipment manufacturers, and authorized personnel during checking of Firefighters' Emergency Operation (see 8.1). ((~~and 8.6.11.1).~~))

((~~Where provided, a lock box, including its lock and other components, shall conform to the requirement of UL 1037 (see Part 9).~~

~~NOTE (2.27.8): Local authorities may specify additional requirements for a uniform keyed and its location to contain the necessary keys.~~))

Note: See 3028.5 for Phase I and Phase II quarterly testing requirements.

SECTION 3020
NEW INSTALLATIONS – CONSTRUCTION OF HOISTWAYS, MACHINE ROOMS AND CONTROL ROOMS

3020.1 Construction of hoistways. All new elevator hoistways shall comply with ASME/CSA B44 A17.1, section 2.1 as amended below.

SECTION 2.1
CONSTRUCTION OF HOISTWAYS AND HOISTWAY ENCLOSURES

2.1.1 Hoistway Enclosures

((~~Hoistway enclosures shall conform to 2.1.1.1, 2.1.1.2, or 2.1.1.3.~~))

Hoistways that penetrate a floor/ceiling assembly shall be protected by a fire-resistance-rated enclosure complying with this section.

Exceptions:

1. In other than Group H occupancies, an enclosure is not required for elevators located within atriums complying with Section 404. The elevator is required to comply with 2.1.1.3.
2. Hoistway enclosures are not required to be fire-resistance rated as provided in items 2.1 and 2.2.
   - 2.1 In parking garages, hoistway enclosures that serve only the parking garage are not required to be rated.
   - 2.2 In other than Groups I-2 and I-3, hoistway enclosures are not required to be rated, if the hoistway:
     - 2.2.1 Does not connect more than two stories.
     - 2.2.2 Does not open to a corridor in Group I and R occupancies.
     - 2.2.3 Does not open to a corridor on nonsprinklered floors in any occupancy.
     - 2.2.4 Is separated from floor openings and air transfer openings serving other floors by construction conforming to required shaft enclosures.
     - 2.2.5 Is limited to one smoke compartment.

2.1.1.1 Fire-Resistive Construction

2.1.1.1.1 Where rated hoistway enclosures are required the enclosure shall be of fire-resistance rated construction as required for shafts by Section 713.4. ((~~Where fire resistive construction is required, hoistways shall be enclosed in conformance with the requirements of the building code (see 1.3).~~))

2.1.1.1.2 Partitions between hoistways and machine rooms and control rooms

(((~~a) machinery spaces outside the hoistway~~

~~(b) machine rooms~~

~~(c) control spaces outside the hoistway~~

~~(d) control rooms that have~~)) shall be fire partitions complying with Section 708 having a fire-resistive rating of at least one hour, or shall be of noncombustible solid ((~~or openwork~~)) construction ((~~that meets the requirements of 2.1.1.2.2(d)(1), (2), and (3)~~)). Partitions ((~~of solid construction~~)) shall be permitted to have openings essential for ropes, drums, sheaves, and other elevator equipment.

((~~Openwork construction shall reject a ball 25 mm (1 in.) in diameter, except where there are openings essential for ropes, drums, sheaves, and other elevator equipment.~~))

2.1.1.1.3 Hoistway enclosure openings shall be protected in accordance with Section 716 as required for fire partitions. Doors shall be self- or automatic-closing by smoke detection in accordance with Section 716.2.6.6 and ASME A17.1, 2.11.6.3. ((~~with entrances or access doors having a fire protection rating conforming to the requirements of the building code.~~))

2.1.1.2 Non-Fire-Resistive Construction

2.1.1.2.1 Where fire-resistive construction is not required by 2.1.1, ((~~the building code,~~)) hoistway construction shall conform to 2.1.1.2.2 or 2.1.1.3.

2.1.1.2.2 The hoistway shall be fully enclosed ((~~conforming to (a) through (d); (a), (b), and (e).~~

~~(a) Enclosures and doors shall be unperforated to a height of 2 000 mm (79 in.) above each floor or landing and above the treads of adjacent stairways. The enclosure shall be unperforated, adjacent to, and for 150 mm (6 in.) on either side of any moving equipment that is within 100 mm (4 in.) of the enclosure.~~))

(b) Partitions between hoistways and machine rooms and control rooms

(((~~(1) machinery spaces outside the hoistway~~

~~(2) machine rooms~~

~~(3) control spaces outside the hoistway~~

~~(4) control rooms~~)) shall be of solid ((~~or open work~~)) construction ((~~that meets the requirements of (d) (1 through (d), and (3)~~)). Partitions of solid construction shall be permitted to have openings essential for ropes, drums, sheaves, and other elevator equipment. ((~~Openwork construction shall reject a ball 25 mm (1 in.) in diameter, except where there are openings for ropes, drums, sheaves, and other elevator equipment.~~

~~(c) Openwork enclosures, where used above the 2 000 mm (79 in.) level, shall reject a ball 25 mm (1 in.) in diameter.~~

~~(d) Openwork enclosures shall be~~

~~(1) at least 2.2 mm (0.087 in.) thick wire, if of steel wire grille~~

~~(2) at least 2.2 mm (0.0 in.) thick, if of expanded metal~~

~~(3) supported and braced as to deflect not over 15 mm (0.6 in.) when subjected to a force of 450 N (100 lbf) applied horizontally at any point~~))

(e) Enclosures shall be permitted to be glass, provided it is laminated glass conforming to ANSI Z97.1, 16 CFR Part 1201 ((~~CAN/CGSB 12.1, whichever is applicable~~)) (see Part 9). Markings as specified in the applicable standard shall be on each separate piece of glass and shall remain visible after installation.

2.1.1.2.3 Entrances shall be in conformance with 2.11, except 2.11.14 through 2.11.16, and 2.11.18.

2.1.1.3 Partially Enclosed Hoistways. For elevators that are not required to be fully enclosed by 2.1.1, protection at least 2 400 mm (94.5 in.) high shall be provided on the hoistway sides that are located 1 500 mm (59 in.) or less from elevator equipment to areas accessible to other than elevator personnel. Such protection shall comply with 2.1.1.2.

2.1.1.4 Multiple Hoistways. The number of elevators permissible in a hoistway shall be in conformance with the *Seattle Building Code.*

2.1.1.5 Strength of Enclosure. The hoistway enclosure adjacent to a landing opening shall be of sufficient strength to maintain, in true lateral alignment, the hoistway entrances. Operating mechanisms and locking devices shall be supported by the building wall, if load-bearing, or by other building structure. Adequate consideration shall be given to pressure exerted on hoistway enclosures as a result of windage and elevator operation. In *high-rise buildings* in Risk Category III or IV in accordance with Section 1604.5, for fire service access elevators according to Section 403.6.1, and in all buildings that are more than 420 feet (128 m) in *building height*, hoistway enclosures shall comply with Section 403.2.3.

3020.2 Private residence elevator hoistways. Hoistways for private residence elevators shall comply with Section 3020.1. ASME A17.1/CSA B44, 5.3.1.1, 5.3.1.1.1 and 5.3.1.1.2 do not apply.

3020.3 Location of equipment. Motor controllers, motion controllers and drives shall not be located in hoistways.

3020.4 Construction requirements—machine rooms, control rooms and private resident machine and control rooms.

3020.4.1 Elevator machine rooms and control rooms.

[W] 3020.4.1.1 Maintain access. Provide and maintain a clear, permanent and safe access to elevator machine rooms and control rooms. Panels or doors for the purpose of accessing nonelevator equipment are not permitted in elevator machine rooms. Passage through the machine room may not be used to gain access to other parts of the building that do not contain elevator equipment.

3020.4.1.2 Location of elevator controls and machinery. Elevator controls and machinery, other than driving machines and governors shall be located in a room dedicated exclusively to elevator equipment. Listed electrical equipment that serves the machine room is permitted to be installed in machine rooms. Air conditioning equipment is permitted to be installed in machine rooms in accordance with ASME A17.1/CSA B44, 2.8.5.

3020.4.2 Fire-resistance rating of machine and control rooms. Elevator machine rooms and control rooms that are adjacent to the hoistway with unprotected openings into the hoistway shall be enclosed by fire partitions and horizontal assemblies with a fire-resistance rating of at least one-hour but not less than the rating of the hoistway. The separation between the room and the hoistway is permitted to be nonrated. Exterior walls and roofs are not required to have a fire-resistance rating unless required by other sections of this code.

ASME A17.1/CSA B44 sections 2.7.1.1 and 2.7.1.2 are superseded by this section.

3020.4.3 Machine rooms and control rooms for electric elevators. All machine rooms and control rooms for electric elevators shall comply with ASME A17.1 Section 2.7, Enclosure of Machine Rooms and Machinery Spaces, except 2.7.1.1 and 2.7.1.2.

3020.4.4 Machine rooms and control rooms for hydraulic elevators. All machine rooms and control rooms for hydraulic elevators shall have fire-resistive construction as required by Section 3020.4. Hydraulic elevator machine and control rooms are permitted to be located overhead, adjacent to, underneath the hoistway, or at a remote location. They shall not be located in the hoistway. Where hydraulic machines and electrical control equipment are located in spaces separated from the hoistway enclosure (see ASME/CSA B44 2.1.1 and 3020.1), such spaces shall be separated from other parts of the building by enclosures conforming to ASME/CSA B44 2.7.1.2 as amended by this code. ASME/CSA B44 A17.1 Section 3.7 is superseded by this section.

3020.5 Working clearances. The following working clearances shall be provided inside the machine room or control room for all elevators.

1. The width of working space in front of controllers shall be the width of the controller or 30 inches, whichever is greater. The depth of the working space in the direction of access shall be not less than 48 inches.
2. The minimum clear space working clearances for freestanding equipment shall be 18 inches on two sides and between units of controllers, selectors and/or walls or other building obstructions. The 18 inch side clearance is permitted to be combined to permit 36 inches clear on one side only.
3. The minimum space at the rear of controllers with back-wiring, terminals or other elements requiring access shall be 36 inches.
4. The working space shall be free of pipes, vents, storage, ducts or any other obstruction.
5. The lighting control switch shall be located inside the machine room, and where practical, within twenty-four inches of the lock jamb side of the machine room door.

Exception: If approved by the *building official*, space outside elevator control rooms and machine rooms is permitted to be used to provide working clearance required for the front of controllers for rooms containing only elevator controls. If the space outside the room serves as a means of egress, not more than one-half the required egress width shall overlap the working clearance. If space outside the control room or machine room is used to provide working clearance, means shall be provided for protection of the working clearance during alteration, repair and maintenance of elevator equipment. The working clearance shall be located in conditioned space. The room where the controls or machines are located shall comply with all other requirements for control rooms or machine rooms.

Note: See additional electrical and working clearance requirements in *Seattle Electrical Code* 620.5.

[W] 3020.6 Location of main line disconnects. In addition to *Seattle Electrical Code* sections 620.5 and 620.51, the following apply:

1. The main line disconnect switch(es) or circuit breaker shall be located inside the machine room door on the lock jamb side of the machine room door and not more than twenty-four inches from the jamb to the operating handle; and it shall be at a height of not more than sixty-six inches above the finish floor.

2. For multicar machine rooms the switches shall be grouped together as close as possible to that location.
3. For machine rooms with double swing doors, the doors shall swing out and the switch(es) shall be on the wall adjacent to the hinge side of the active door panel.
4. The switch(es) shall be designed so that they may be locked out and tagged in the open position.

Exception: Special purpose, residential elevators and residential inclined elevators are exempt from this section.

3020.7 Machine rooms or control rooms for private residence elevators. Private residence elevators shall be provided with a machine room or control room. No fire resistance rating is required for private residence elevator equipment or machine rooms. Where the machine and brake are located at the top of the hoistway, a minimum 8-inch by 10-inch access panel shall be provided. The panel shall be lockable.

Exception: A separate machine room or control room is not required for private residence elevators which conform with ASME/CSA B44 A17.1, CSA B44 5.3.1.6 Machinery Spaces, Machine Rooms, Control Spaces, and Control Rooms as amended below:

5.3.1.6.1 Where elevator equipment is located in a room ((~~or space~~)) that contains other machinery and equipment

(a) the elevator equipment shall be guarded in conformance with 2.10.1. Where the guarding can be removed, a sign in conformance with the reequipments of ANSI Z535.2 or CAN/CSA-Z321, whichever is applicable, shall be located on or adjacent to the guarding warning of the potential hazards.

(b) pipes conveying steam, gas, or liquids shall be guarded or located to prevent discharge onto the equipment.

5.3.1.6.2 The motor controller and operation controller shall be located in a cabinet(s). The cabinet(s) shall be

(a) readily accessible for maintenance and inspection at all times.

(b) provided with a cabinet door(s) or panel(s) that is not self-closing and shall be kept closed.

5.3.1.6.3 In machine rooms, machinery spaces, and control rooms, ((~~and control spaces,~~)) all sheaves and sprockets shall be guarded to protect against accidental contact.

5.3.1.6.4 Maintenance Path and Clearance. A permanent and unobstructed path shall be provided to machinery spaces. ((~~and control spaces.~~)) The path shall provide a clear width 450 (18 in.) minimum. Where elevator equipment is located in a room or space containing other machinery and equipment

(a) the elevator equipment shall be located to eliminate any obstructions that prohibit operating or servicing the equipment.

((~~(b) if an obstruction does not prohibit the operation or servicing of the equipment but creates an interference with servicing the equipment, a sign in conformance with the requirements of ANSI Z535.2 or CAN/CSA-Z321, whichever is applicable, shall be prominently posted at the entrance to the work space warning of the obstruction.~~))

5.3.1.6.5 Temperature and Humidity in Machinery Spaces, Machine Rooms, Control Spaces, and Control Rooms. Temperature and humidity shall comply with 2.7.9.2.

3020.8 Labeling. Elevator machine and control rooms shall be provided with sign that reads "Elevator Equipment Room or Machine Room, Authorized Personnel Only, No Storage." In buildings with more than one machine room or control room, the label shall identify which cars are served by the equipment in the room(s). Where the room sign is separated from normally occupied areas or normal paths of travel by additional door(s), the additional door(s) shall be provided with signage indicating that the elevator machine or control room or equipment room is on the other side of the door(s). All lettering shall not be less than 1 inch high and shall contrast with the background.

Exception: Private residence elevators are not required to comply with this section.

SECTION 3021
NEW INSTALLATIONS – FLOORS

3021.1 Floors. All new elevator hoistways, machine rooms and control rooms shall comply with ASME A17.1/CSA B44, 2.1.3.3, Construction of Floors, as amended below. ASME A17.1/CSA B44, 2.1.3.4 is not adopted.

ASME 2.1.3.3 Construction of Floors. Floors of hoistways, control rooms and machine rooms shall ((~~be of concrete or metal construction with or~~)) have a coated concrete or metal surface without perforations that will resist absorption of oil, grease and similar materials. Control rooms and machine rooms shall have floors that cover the entire area of the room. ((~~Metal floors shall conform to the following:~~

~~(a) If of bar type grating, the openings between bars shall reject a ball 20 mm (0.8 in.) in diameter.~~

~~(b) If of perforated sheet metal or of fabricated open-work construction, the openings shall reject a ball 2 mm (1 in.) in diameter.~~))

SECTION 3022
EQUIPMENT IN HOISTWAYS, MACHINE ROOMS AND CONTROL ROOMS
(ASME A17.1 Section 2.8)

3022.1 Prohibited wiring, pipes and ducts. In accordance with ASME A17.1/CSA B44 Section 2.8 non-elevator electric wiring, pipes and ducts are prohibited in elevator machine rooms, control rooms and hoistways except as otherwise provided in this section. The use of false ceilings and furring does not remove such items from the elevator spaces and shall not be acceptable except as allowed by ASME A17.1, 2.8.2 as amended below.

3022.2 Amendment to ASME A17.1/CSA B44 2.8.3 All elevator hoistways, machine rooms and control rooms shall comply with ASME A17.1/CSA B44 2.8.1 and 2.8.3, as amended below.

ASME 2.8 Equipment in Hoistways, Machinery Spaces, Machine Rooms, ((~~Control Spaces,~~)) and Control Rooms

2.8.1 Equipment Allowed. Only machinery and equipment used directly in connection with the elevator shall be permitted in elevator hoistways, ((~~machinery spaces,~~)) machine rooms, ((~~control spaces,~~)) and control rooms.

2.8.3 Pipes, Ducts, Tanks, and Sprinklers

2.8.3.1 ((~~Steam and hot water pipes shall be~~)) Pipes conveying gases, vapors or liquids are not permitted to be installed in hoistways, machinery spaces, machine rooms, ((~~control spaces,~~)) and control rooms unless necessary for operation or maintenance of the elevator and not used for any other purpose. ((~~for the purpose of heating these areas only, subject to 2.8.3.1.1 through 2.8.3.1.3.~~))

Exception: Subject to the approval of the *building official*, pipes that are not necessary for operation or maintenance of the elevator are permitted in machinery spaces, machine rooms and control rooms if they are protected with double containment and the joints within the machine space, machine room or control room are threaded, soldered or welded. Pipes shall not be located less than 7 feet above the floor in machine rooms.

((~~**2.8.3.1.1** Heating pipes shall convey only low pressure steam [100 kPa (15 psi) or less] or hot water [100° C (212° F) or less].~~

~~**2.8.3.1.2** All risers and return pipes shall be located outside the hoistway. When the machinery space, machine room, control space, or control room is located above the roof of the building, heating pipes for the machinery space, machine room, control space, or control room shall be permitted to be located in the hoistway between the top floor and the machinery space, machine room, control space, or control room.~~

~~**2.8.3.1.3** Traps and shutoff valves shall be provided in accessible locations outside the hoist way.~~))

2.8.3.1.4 The means used for air-sampling smoke detection systems shall be permitted to be installed in hoistways, machinery spaces, machine rooms, ((~~control spaces,~~)) and control rooms for the purpose of detecting smoke in accordance with 2.27.3.2, Phase I Emergency Recall Operation by Fire Alarm Initiating Devices, and shall not encroach upon required clearances. Sensing elements penetrating the hoistway enclosure shall have a fire resistance rating conforming to the requirement of the building code.

2.8.3.2 Ducts shall be permitted to be installed in the hoistway, ((~~machinery space,~~)) machine room, ((~~control space,~~)) or control room for the purpose of heating, cooling, ventilating, and venting these areas only and shall not encroach upon the required clearances.

Ducts and electrical conduit are permitted to pass through an elevator machine room or control room if they are separated from the room by construction equal to the rated construction of the room and so located that all required clearances are maintained.

2.8.3.3 Sprinkler systems conforming to NFPA 13 ((~~or the NBCC, whichever is applicable~~)) see Part 9 shall be permitted to be installed in the hoistway, ((~~machinery space,~~)) machine room, ((~~control space,~~)) or control room subject to rules promulgated by the *building official.* ((~~2.8.3.3.1 through 2.8.3.3.4~~))

Note: Also see joint DPD Director's Rule 7-2014/SFD Administrative Rule 9.06.14 for sprinkler requirements.

((~~**2.8.3.3.1** All risers shall be located outside these spaces. Branch lines in the hoistway shall supply sprinklers at not more than one floor level. When the machinery space, machine room, control space, or control room is located above the roof of the building, risers and branch lines for these sprinklers shall be permitted to be located in the hoistway between the top floor and the machinery space, machine room, control space, or control room.~~

~~**2.8.3.3.2** In jurisdictions not enforcing the NBCC, where elevator equipment is located or its enclosure is configured such that application of water from sprinklers could cause unsafe elevator operation, means shall be provided to automatically disconnect the main line power supply to the affected elevator and any other power supplies used to move the elevator upon or prior to the application of water.~~

~~(a) This means shall be independent of the elevator control and shall not be self-resetting.~~

~~(b) Heat detectors and sprinkler flow switches used to initiate main line elevator power shut down shall comply with the requirements of NFPA 72.~~

~~(c) The activation of sprinklers outside of such locations shall not disconnect the main line elevator power supply. See also 2.27.3.3.6.~~

~~(d) The activation of sprinklers outside of such location shall not disconnect the mainline elevator power supply. See also 2.27.3.3.6.~~

~~(e) This means shall only be provided for elevators that are equipped with Phase I Emergency Recall Operation (see 2.27.3).~~

~~**2.8.3.3.3** Smoke detectors shall not be used to activate sprinklers in these spaces or to disconnect the main line power supply.~~))

2.8.3.3.4 ((~~In jurisdictions not enforcing the NBCC, when~~)) Where sprinklers are installed not more than 600 mm (24 in.) above the pit floor, (a) and (b) apply to elevator electrical equipment and wiring in the hoistway located less than 1200 mm (48 in.) above the pit floor, except earthquake protective devices conforming to 8.4.10.1.2(e); and on the exterior of the car at the point where the car platform sill is level with the sill at the bottom terminal landing.

(a) Elevator electrical equipment shall be weatherproof (Type 4 as specified in NEMA 250).

(b) Elevator wiring, except traveling cables, shall be identified for use in wet locations in accordance with the requirements in the ((~~NFPA 70~~)) *Seattle Electrical Code*.

2.8.3.4 Other pipes or ducts conveying gases, vapors, or liquid and not used in connection with the operation of the elevator shall not be installed in any hoistway, machinery space, machine room, ((~~control space,~~)) or control room. Where a machinery space, machine room, ((~~control space,~~)) control room, or hoistway extends above the roof of a building, pipes shall be permitted from roof drains to the closest point where they can be diverted out of this space. Pipes shall be covered to prevent leakage or condensate from entering the ((~~machinery space,~~)) machine room, ((~~control space,~~)) control room, or hoistway.

2.8.3.5 Where permitted and provided, pipes, drains, and tanks, or similar equipment that contains liquids, shall not be located directly above the elevator equipment and shall not encroach upon the required clearances in the hoistway, ((~~machinery space,~~)) machine room, ((~~control space,~~)) or control room.

SECTION 3023 PITS
(ASME A17.1/CSA B44, 2.2.2)

3023.1 Access to Pits. All pits shall comply with ASME A17.1/CSA B44, 2.2.4 as amended below:

ASME 2.2.4 Pit Access. Safe and convenient access shall be provided to all pits and shall conform to 2.2.4.1 through 2.2.4.6.

2.2.4.1 Access shall be by means of the lowest hoistway door or by means of a separate pit access door.

2.2.4.2 There shall be installed in the pit of each elevator, where the pit extends more than 900 mm (35 in.) below the sill of the pit access door (lowest hoistway door or separate pit access door), a fixed vertical ladder of noncombustible material, located within reach of the access door, a fixed vertical ladder of noncombustible material, located within reach of the access door. The ladder is permitted to be retractable or nonretractable. Nonretractable ladders, where provided, shall conform to 2.2.4.2.1 through 2.2.4.2.6. Retractable ladders, where provided, shall conform to 2.2.4.2.1 through 2.2.4.2.3 and 2.2.4.2.5 through 2.2.4.2.8. When in the extended position, retractable ladders shall conform to 2.2.4.2.4.

2.2.4.2.1 The ladder shall extend not less than 1 200 mm (48 in.) above the sill of the access door or handgrips shall be provided to the same height.

2.2.4.2.2 The ladder rungs, cleats, or steps shall be a minimum of 400 mm (16 in.) wide. When obstructions are encountered, the width shall be permitted to be decreased to less than 400 mm (16 in.). The reduced width shall be as wide as the available space permits, but not less than 225 mm (9 in.).

2.2.4.2.3 The ladder rungs, cleats, or steps shall be spaced 300 mm (12 in.) ± 13 mm (± 0.5 in.) on center, shall be provided to not less than the height of access door sill, and shall be designed to minimize slipping (e.g. knurling, dimpling, coating with skid- resistant material).

2.2.4.2.4 A clear distance of not less than 115 mm (4.5 in.) from the centerline of the rungs, cleats, or steps to the nearest permanent object in back of the ladder shall be provided.

2.2.4.2.5 Side rails, if provided, shall have a clear distance of not less than 115 mm (4.5 in.) from their centerline to the nearest permanent object.

2.2.4.2.6 The ladder and its attachments shall be capable of sustaining a load of 135 kg (300 lb.)

2.2.4.2.7 Retractable ladders that are in the line of movement of the car or counterweight when not fully retracted, shall operate a retractable ladder electrical device (see 2.26.2.38) that shall cause the power to be removed from the elevator driving-machine motor and brake unless the ladder is in its fully retracted position.

2.2.4.2.8 Retractable ladders shall be capable of being extended, mechanically secured and unsecured, and retracted from the access door, and

(a) the force(s) required to extend a retractable ladder from the fully retracted position to the extended and mechanically secured position shall not exceed 220 N (50 lbf)

(b) after being extended and mechanically secured, a retractable ladder shall remain secured in the extended position when subjected to a horizontal force not to exceed 2 220 N (500 lbf)

(c) the force(s) required to retract a retractable ladder from its extended position to its fully retracted position, after being unsecured, shall not exceed 220 N (50 lbf)

(d) the ladder shall be mechanically secured when in the retracted position.

2.2.4.3 Pit access by a ladder shall not be permitted when the pit floor is more than 3 000 mm (120 in.) below the sill of the access door, except where there is no building floor below the bottom terminal landing, this height shall be permitted to be greater but not more than 4 200 mm (165 in.).

2.2.4.4 Pits shall be accessible only to elevator personnel.

2.2.4.5 A separate pit access door, when provided, shall be subject to the following requirements:

(a) If the door swings into the pit, it shall be located so that it does not interfere with moving equipment.

(b) If the door swings out, and the lowest structural or mechanical part, equipment, or device installed beneath the car platform, except guide shoes or rollers or safety jaw assemblies, projects below the top of the separate pit access door opening when the car is level with the bottom terminal landing

(1) an electric contact conforming to 2.26.2.26 shall be provided to prevent operation of the elevator when the door is open

(2) the door shall be provided with a vision panel(s) that is glazed with clear wired glass not less than 6 mm (0.25 in.) thick, will reject a ball 150 mm (6 in.) in diameter, and have an area of not more than 0.03 m^2 (47 $in.^2$).

(c) The door shall provide a minimum opening of 750 mm (29.5 in.) in width and 1 825 mm (72 in.) in height.

(d) The door shall be equipped with a barrier conforming to 2.11.1.2(i), where the door sill is located more than 300 mm (12 in.) above the pit floor.

(e) The door shall be self-closing and provided with a spring-type lock arranged to permit the door to be opened from inside of the pit without a key. Such doors shall be kept closed and locked. A key shall be required to unlock the lock from outside the hoistway. The key shall be of Group 1 Security (see 8.1).

(f) Separate pit access doors shall not be located where a person, upon entering the pit, can be struck by any part of the car or counterweight when either is on its fully compressed buffer, or provided with an electrical contact conforming to 2.26.2.26 shall be provided to prevent operation of the elevator when the door is open.

(g) In hoistways with more than one elevator, a sign shall be provided on the pit access door identifying which cars are served by that hoistway. Lettering shall not be less than 1 inch high and shall contrast with the background of the sign. The sign shall identify which car is to be taken out of service if an electric contact is provided.

2.2.4.6 Means to unlock the access door from inside the pit shall be provided. The means shall be located

(a) when no pit ladder is provided, not more than 1 825 mm (72 in.) vertically above the pit floor, or

(b) when a pit ladder is provided, not more than 1 825 mm (72 in.) vertically above a rung, cleat, or step. The minimum distance from the top rung, cleat, or step to the top of the pit ladder or handhold shall not be less than 1 200 mm (48 in.) (see 2.4.2.1 and Nonmandatory Appendix J, Fig. J-1), and

(c) with the door in the closed position, in a plane not more than 1 000 mm (39 in.) horizontally from a rung, cleat, or step of the pit ladder (see Nonmandatory Appendix J, Fig. J-1).

3023.2 Access to underside of cars. Access to the underside of cars shall comply with ASME A17.1/CSA B44, 2.2.8 as amended below:

2.2.8 Access to Underside of Car. Where the distance from the pit floor to the underside of the plank channels or slings exceeds 2 100 mm (83 in.), with the car at the lowest landing, a means shall be permanently installed or permanently stored in the pit to provide access to the equipment on the underside of the car. When access is provided by means of a working platform it shall conform to the requirements of 2.7.5.3.2 through 2.7.5.3.6.

When working platform inspection operation is provided according to 2.7.5.3.6, in hoistways containing a single elevator

(a) a pit access door is required, or

(b) an additional elevator personnel shall be present outside the hoistway when the pit inspection operation is in effect.

SECTION 3024
SHUTOFF VALVE (ASME A17.1/CSA B44, 3.19.4.1)

3024.1 Hydraulic elevator shutoff valve. All hydraulic elevators shall comply with ASME A17.1, 3.19.4.1, Shutoff Valve, as amended below:

ASME 3.19.4.1 Shutoff Valve. A manually operated shutoff valve shall be provided between the hydraulic machines and the hydraulic jack.

((~~**3.19.4.1.1** When the hydraulic machine is located outside the hoistway, the shutoff valve shall be located adjacent to the hydraulic machine (see Section 8.1).~~

~~**3.19.4.1.2** Where the hydraulic machine is located in the hoistway, the manually operated shutoff valve shall be permitted to be located inside the hoistway, provided that it is accessible from outside the hoistway to elevator personnel only (see 8.1). The shutoff valve shall have a means to indicate the fully opened and fully closed positions at the location of the operation.~~))

[W] 3024.2 Shut-off valves for hydraulic elevators. Two shut-off valves may be required.

(1) ASME requires that a shut-off valve be installed in the machine room.

(2) When the pit is lower than the machine, a shut-off valve shall be installed in the pit.

A separate shut-off valve is not required in the pit for hydraulic elevators equipped with a overspeed valve that rotates no more than 180 degrees to stop the flow of hydraulic fluid and has a safety shut-off handle capable of being grasped.

SECTION 3025
GUARD AT CEILING INTERSECTION (ASME A17.1/CSA B44, 6.1.3.3.11)

3025.1 Escalator guards. All escalators shall comply with ASME A17.1/CSA B44, 6.1.3.3.11, Guard at Ceiling Intersection, and the following:

Guards shall be provided at any pinching, snagging or wedging points between the handrail, balustrade and adjacent building components or equipment if such points are within the clearances delineated in 6.1.3.3.11.

SECTION 3026
TEST REPORTS

3026.1 Test reports. For tests required by Section 3028 and ASME 17.1/CSA B44, Part 8, as amended in this code, immediately after tests are completed all test results shall be submitted to the *building official* for approval on forms furnished by the *building official*. The submitted results shall be signed by the person performing the tests and shall identify the testing firm. Copies of the completed forms shall be provided to the owner or to the owner's authorized agent.

SECTION 3027
ACCEPTANCE INSPECTIONS AND TESTS

3027.1 Acceptance inspections and tests. Inspections and tests shall comply with ASME A17.1/CSA B44, 8.10, Acceptance Inspection and Tests, as amended below.

ASME 8.10.1 General Requirements for Acceptance Inspections and Tests

8.10.1.1 Persons Authorized to Make Acceptance Inspections and Tests

8.10.1.1.1 The acceptance inspection shall be made by an inspector employed by the ((~~authority having jurisdiction, or by a person authorized by the authority having jurisdiction~~)) *building official*.

8.10.1.1.2 The person installing or altering the equipment shall perform all of the tests required by 8.10.2 through 8.10.5 in the presence of the inspector specified in 8.10.1.1.1.

((~~**8.10.1.1.3** The inspector shall meet the qualification requirements of the ASME QEI-1. Inspectors and inspection supervisors shall be certified by an independent, accredited, certifying organization as specified in 8.10.1.2 (see Section 1.3).~~))

SECTION 3028
PERIODIC INSPECTIONS AND TESTS

3028.1 Persons authorized to make periodic inspections and witness tests. Periodic inspection and tests shall comply with ASME A17.1/CSA B44, 8.11 as amended below.

8.11.1 General Requirements for Periodic Inspections and Witnessing of Tests

((~~**8.11.1.1 Persons Authorized to Make Periodic Inspections and Witness Tests.** The inspector shall meet the qualification requirements of the ASME QEI-1. Inspectors and inspection supervisors shall be certified an independent, accredited, certifying organization as specified in 8.10.1.2 (see 1.3).~~))

8.11.1.1.1 Periodic Inspections

(a) Periodic inspections shall be made by an inspector employed by the ((~~authority having jurisdiction~~)) *building official* or by a person authorized by the ((~~authority having jurisdiction~~)) *building official*.

((~~(b) The inspector shall submit a signed written report to the authority having jurisdiction containing the following information:~~

~~(1) date of inspection(s)~~

~~(2) components or systems that have not been inspected~~

~~(3) Code deficiencies noted during the inspection and a statement as to corrective action taken, if any~~))

8.11.1.1.2 Periodic tests

(a) Periodic tests as required in 8.6 shall be performed by elevator personnel that are qualified to perform such tests. These tests shall be witnessed by an inspector (see 8.11.1.1) employed by the ((~~authority having jurisdiction~~)) *building official*, or by persons authorized by the ((~~authority having jurisdiction~~)) *building official*.

((~~(b) The inspector shall submit a signed written report to the authority having jurisdiction containing the following information:~~

~~(1) date of inspection(s)~~

~~(2) type of test(s) performed~~

~~(3) detailed results of the test(s) including but not limited to, speed, governor trip speed, safety slide distance, relief valve setting, escalator/moving walk brake torque setting, etc.~~

~~(4) Code deficiencies noted during the test~~

~~(5) statement as to any corrective action taken~~))

8.11.1.2 Applicability of Inspection Requirements. Inspections required by 8.11.2 through 8.11.5 are to determine that the existing equipment conforms with the following applicable Code requirements:

(a) the Code at the time of installation

(b) the Code effective as applicable to and for each alteration

((~~(c) the ASME A17.3 Code, if adopted by the authority having jurisdiction~~

~~NOTES (8.11.1.2):~~

~~(1) The ASME A17.2 Guide for Inspection of Elevators, Escalators, and Moving Walks (see Preface, ASME Elevator Publications) is a guide for inspections.~~

~~(2) References to "Items" of the ASME A17.2 Guide for Inspection of Elevators, Escalators, and Moving Walks and to the requirements of this Code are indicated in parentheses as a convenient reference to the applicable inspection procedures and requirements. It is important to understand that suggested test and inspection methodologies represent an approach but are neither exclusive nor comprehensive.~~))

8.11.1.3 Periodic Inspection and Test Frequency. The equipment listed in Table 3028 shall be inspected and tested at the intervals specified in Table 3028. ((~~The frequency of periodic inspections and tests shall be established by the authority having jurisdiction.~~))

NOTE: Recommended intervals for periodic inspections and tests can be found in ((~~Nonmandatory Appendix N~~)) Table 3028.

8.11.1.4 Installation Placed Out of Service. Periodic inspections and tests shall not be required when an installation is placed "out of service":

(a) as defined by the ((~~authority having jurisdiction~~)) *building official;* or

(b) when an installation whose power feed lines have been disconnected from the mainline disconnect switch; and

(1) an electric elevator, dumbwaiter, or material lift whose suspension ropes have been removed, whose car and counterweight rest at the bottom of the hoistway, and whose hoistway doors have been permanently barricaded or sealed in the closed position on the hoistway side;

(2) a hydraulic elevator, dumbwaiter, or material lift whose car rests at the bottom of the hoistway; when provided with suspension ropes and counterweight, the suspension ropes have been removed and the counterweight rests at the bottom of the hoistway; whose pressure piping has been disassembled and a section

removed from the premises and whose hoistway doors are permanently barricaded or sealed in the closed position on the hoistway side; or

(3) an escalator or moving walk whose entrances have been permanently barricaded.

8.11.1.5 Making Safety Devices Ineffective. No person shall at any time make any required safety device or electrical protective device ineffective, except where necessary during tests and inspections. Such devices shall be restored to their normal operating condition in conformity with the applicable requirements prior to returning the equipment to service (see 2.26.7).

8.11.1.7 Unique or Product-Specific Procedures or Methods. Where unique or product-specific procedures or methods are required to maintain, repair, replace, inspect, or test equipment, such procedures or methods shall be provided by the manufacturer or installer. These procedures and any unique devices required by the procedures for inspection and testing shall be accessible on site to elevator personnel [see 8.6.1.2.2(b)].

8.11.1.8 Maintenance Control Program. The Maintenance Control Program complying with 8.6.1.2.1 shall be available. On-site equipment documentation complying with 8.6.1.2.2 and maintenance records complying with 8.6.1.4 shall be available.

8.11.1.9 Devices Not Coved in Section 8.11. When any device on which the safety of users is dependent is installed that is not specifically covered in Section 8.11, it shall be inspected and tested in accordance with the requirements of the manufacturer's or the altering company's procedures (see 8.6.1.6.1 and 8.7.1.2). Documentation that contains the testing procedures of these devices shall remain with the equipment and be available in the on-site documentation (see 8.6.1.2.2). The removal or disabling of such devices shall be considered an alteration and shall comply with 8.7.1.2.

TABLE 3028
INSPECTION AND TEST INTERVALS
Note: Intervals are specified in months; sections reference ASME A17.1 unless otherwise specified

Section	Equipment Type	Periodic Inspections		Periodic Tests							
				Category One		Category Three		Category Five		Other	
		Requirement	Interval	Requirement	Interval	Requirement	Interval	Requirement	Interval	Requirement	Interval
8.6.11.1	Firefighter's emergency operation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8.6.11.1	3
8.11.2	Electric elevators	8.11.2.1	12	8.6.4.19	12	N/A	N/A	8.6.4.20	60		
8.11.3	Hydraulic elevators	8.11.3.1	12	8.6.5.14	12	8.6.5.15	36	8.6.5.16	60		
8.11.4; SBC 3028	Escalators & moving walks	8.11.4.1	12	8.6.8.15	12	N/A	N/A	N/A	N/A	SBC 3028	12
8.11.5.3	Hand elevators	8.11.2.1	12	8.6.4.19	12	N/A	N/A	8.6.4.20, 8.6.5.16	60		
8.11.5.4	Dumbwaiters	8.11.2.1, 8.11.3.1	12	8.6.4.19, 8.6.5.14	12	8.6.5.15	36	8.6.4.20, 8.6.5.16	60		
8.11.5.5	Material lifts and dumbwaiters with automatic transfer devices	8.11.2.1, 8.11.3.1	12	8.6.4.19, 8.6.5.14	12	8.6.5.15		8.6.4.20, 8.6.5.16	60		
8.11.5.6	Special purpose personnel elevators	8.11.2.1, 8.11.3.1	12	8.6.4.19, 8.6.5.14		8.6.5.15		8.6.4.20, 8.6.5.16	60		
8.11.5.7	Inclined elevators	8.11.2.1, 8.11.3.1	12	8.6.4.19, 8.6.5.14		8.6.5.15		8.6.4.20, 8.6.5.16	60		
8.11.5.9	Screw-column elevators	8.11.2.1, 8.11.3.1	12	8.6.4.19, 8.6.5.14		8.6.5.15		8.6.4.20, 8.6.5.16	60		
8.11.5.10	Rooftop elevators	8.11.2.1, 8.11.3.1	12	8.6.4.19, 8.6.5.14		8.6.5.15		8.6.4.20, 8.6.5.16	60		

TABLE 3028—continued
INSPECTION AND TEST INTERVALS
Note: Intervals are specified in months; sections reference ASME A17.1 unless otherwise specified

Section	Equipment Type	Periodic Inspections		Periodic Tests							
				Category One		Category Three		Category Five		Other	
		Requirement	Interval	Requirement	Interval	Requirement	Interval	Requirement	Interval	Requirement	Interval
8.11.5.11	Rack & pinion elevators	8.11.2.1, 8.11.3.1	12	8.6.4.19, 8.6.5.14		8.6.5.15		8.6.4.20, 8.6.5.16	60		
8.11.5.12	Limited use/ limited application elevators	8.11.2.1, 8.11.3.1	12	8.6.4.19, 8.6.5.14		8.6.5.15		8.6.4.20, 8.6.5.16	60		

3028.2 Category Five tests. Elevators shall be subject to five-year inspection test requirements in accordance with Table 3028, Periodic Test Requirements – Category Five, except that safety and governor systems of cars operating on wood guide rails shall be tested by tripping the governor by hand with rated load in the car, and the car at rest.

All Category Five tests shall comply with ASME A17.1, 8.6 as amended below:

ASME 8.6.4.20 Periodic Test Requirements– Category 5.

NOTE: For test frequency, see ((~~8.11.1.3~~)) Table 3028.

8.6.4.20.1 Car and Counterweight Safeties. Type A, Type B, and Type C car and counterweight safeties shall be tested in accordance with 8.6.4.20.1(a) ((~~or subject to approval by the authority having jurisdiction with 8.6.4.20.1(b)~~)).

(a) *Rated Load and Rated Speed Test.* Car safeties, except those operating on wood guide rails, and their governors, shall be tested with rated load in the car. Counterweight safety tests shall be made with no load in the car. The car speed at which the governor trips shall be determined by means of a handheld tachometer or other device designed to measure car speed, such as controllers, service tools, and accelerometers. Tests shall be made by tripping the governor by hand at the rated speed. If the governor is equipped with a switch that operates when the governor is manually tripped, it must be rendered inoperative. The car safety mechanism switch shall not be rendered inoperative. The emergency brake required by 2.19.3 shall be disabled to prevent it from operating during this test. Since the counterweight safety does not have a safety mechanism switch, the circuit that would remove power from the driving-machine motor and brake must be opened as soon as the elevator stops to minimize slack rope and fallback of the car. The following operational conditions shall be checked (Item 2.29.2):

(1) Type B safeties shall stop the car with the rated load within the required range of stopping distances for which the governor is tripped (Item 2.29.2) and the level of the platform checked for conformance to 2.17.9.2.

(2) For Type A safeties and Type A safety parts of Type C safeties, there shall be sufficient travel of the safety rollers or dogs remaining after the test to bring the car and its rated load to rest on safety application at governor tripping speed. The level of the platform shall be checked for conformance to 2.17.9.2.

((~~(b) *Alternative Test Method for Car Safeties.* The alternative test methods shall comply with 8.6.11.10 and the following:~~

~~(1) The testing of safeties with any load in the car, centered on each quarter of the platform symmetrically with relation to the centerlines of the platform from no load up to rated load, and at not less than rated speed shall be permitted provided that both~~

~~(a) when the alternative test is performed, the test shall stop the car and verify that the safe- ties will be capable of stopping an overspeeding car in accordance with the requirements of Section 2.17 applicable to the specific classification of safeties~~

~~(b) when applied, the method shall verify that the safeties perform or are capable of performing in compliance with (a) and the platform shall not be out of level more than 30 mm/m (0.36 in./ft) in any direction.~~))

(2) The "Periodic Test Record" shall be completed and installed as required by 8.6.1.7.2

8.6.4.20.2 Governors

(a) The tripping speed of the governor and the speed at which the governor overspeed switch, where provided, operates shall be tested to determine conformance with the applicable requirements and the adjustable means shall be sealed (Item 2.13.2.1).

(b) The governor rope pull-through and pull-out forces shall be tested to determine conformance with the applicable requirements, and the adjustment means shall be sealed (Item 2.13.2.1).

(c) After these tests in jurisdictions enforcing NBCC, a metal tag indicating the date of the governor tests, together with the name of the person or firm that performed the tests, shall be attached to the governor in a permanent manner.

8.6.4.20.3 Oil Buffers

(a) Car oil buffers shall be tested to determine conformance with the applicable requirements by either

(1) running the car onto the buffer with rated load at rated speed, or

((~~(2) subject to approval by the authority having jurisdiction~~

~~(a) running the car with any load, from no-load up to rated load onto the buffer at rated speed when the requirements of 8.6.11.10 are com- plied with, provided that when applied the method verifies that the buffer performs or is capable of performing in compliance with 8.6.4.20.3(a), except as specified in 8.6.4.20.3(b) and (c) (Item 5.9.2.1). Counter- weight oil buffers shall be tested by running the counterweight onto its buffer at rated speed with no load in the car, except as specified in 8.6.4.20.3(b) and (c) (Item 5.9.2.1), or~~

~~(b) running the car onto the buffer with any load, from no-load up to rated load, and at less than rated speed, when the requirements of 8.6.11.10 are complied with, provided that when applied, the method verifies that the buffer performs or is capable of performing in compliance with 8.6.4.20.3(a)~~))

(b) For reduced stroke buffers, this test shall be made at the reduced striking speed permitted (Item 5.9.2.1).

(c) This test is not required where a Type C safety is used (see 8.6.4.20.1).

(d) In making these tests, the normal and emergency terminal stopping devices shall be made temporarily inoperative. The final terminal stopping devices shall remain operative and be temporarily relocated, if necessary, to permit compression of the buffer during the test.

(e) After completion of the test, a metal tag, indicating the date of the test, together with the name of the person or firm who performed the test, shall be attached to the buffer [Item 5.3.2(b)].

(f) Counterweight oil buffers shall be tested by running the counterweight onto its buffer at rated speed with no load in the car, except as specified in 8.6.4.20.3(b) and (c) (Item 5.9.2.1), or at reduced speed if the requirements of 8.6.11.10 are met.

(g) A test tag as required in 8.6.1.7.2 shall be provided.

8.6.4.20.4 Driving-Machine Brake(s). For passenger elevators and all freight elevators, the driving-machine brake shall be tested for compliance with applicable requirements, in accordance with 6(a), ((~~or subject to approval by the authority having jurisdiction with 8.6.4.20.4(b).~~))

For elevators installed under ASME A17.1-2000/ CSA B44-00 and later editions, have the brake setting verified in accordance with the data on the brake marking plate.

Upon completion of the test, the means of adjusting the holding capacity shall be sealed to prevent changing the adjustment without breaking the seal. The seal shall bear or otherwise attach the identification of the person or firm that installed it. (See also 8.6.1.7.2, Periodic Test Tags.)

(a) Test with load per Table 8.6.4.20.4. Place the load as shown in Table 8.6.4.20.4 in the car. The driving-machine brake, on its own, shall hold the car with this load. With no load in the car the driving- machine brake shall hold the empty car at rest and shall decelerate an empty car traveling in the up direction from governor tripping speed. The driving- machine brake on freight elevators of Class C-2 loading, when loaded to their maximum design load, shall hold the elevator car at rest (Item 2.17.2.1).

((~~(b) *Alternative Test Method for Driving-Machine Brakes.* The alternative test methods shall comply with 8.6.11.10 and the following:~~

~~(1) Any method of verifying conformity of the driving-machine brake with the applicable Code requirements (see 2.24.8.3 and Table 8.6.4.20.4) shall be permitted, including the testing method of the brakes with or without any load in the car, provided that when applied the method verifies that the brake performs or is capable of performing in compliance with 8.6.4.20.4(a).~~))

(2) A test tag as required in 8.6.1.7.2 shall be provided.

((~~8.6.11.10 Category 5 Tests Without Load Via Alternative Test Methodologies~~

~~**8.6.11.10.1 Where Permitted.** Alternative test methods without load are permitted for Category 5 testing subject to approval by the authority having jurisdiction of~~

~~(a) car and counterweight safeties per 8.6.4.20.1~~

~~(b) oil buffers per 8.6.4.20.3~~

~~(c) driving-machine brakes per 8.6.4.20.4, and~~

~~(d) braking system, traction, and traction limits per 8.6.4.20.10~~

~~NOTE: See 8.10, Note (2).~~

~~**8.6.11.10.2 Alternative Test Method and Tools**~~

~~(a) An alternative test method shall be~~

~~(1) based on sound engineering principles~~

~~(2) validated and documented via engineering tests~~

~~(b) The method, measuring devices, and tools shall be capable of producing reliable and consistent measurements, suitable for the intended measurement. The monitoring and calibration of the measuring devices or tools shall be in accordance with the provider's guidelines.~~

~~**8.6.11.10.3 Alternative Test Method Procedure.** The alternative test method shall~~

~~(a) include requirements to obtain and verify car and counterweight masses if necessary for the test~~

~~(b) have a procedure document that~~

~~(1) defines the permissible equipment range and limitations regarding use~~

~~(2) establishes monitoring and calibration criteria for tools or measuring devices as appropriate~~

~~(3) defines the test set-up procedure~~

~~(4) provides instructions on how to interpret results and correlate the results to pass-fail-criteria~~

~~(c) describe how to correlate no load test results with previously acquired full load and no-load results~~

~~(d) be included in the MCP [see 8.6.1.2.1(a)]~~

~~(e) include the information required by 8.6.1.2.2(b)(5) where applicable~~

~~(f) require a report conforming to 8.6.11.10.4.~~

~~**8.6.11.10.4 Alternative Test Method Report.** The alternative test method report shall~~

~~(a) identify the alternative test tool (make/model) used to perform the test~~

~~(b) identify the company performing the tests, names of personnel conducting and witnessing the tests, and testing dates~~

~~(c) contain all required printouts or record of tests required to demonstrate compliance to the testing requirement that were gathered during an acceptance test~~

~~(d) identify which results from the baseline test are to be used for future compliance evaluation~~

~~(e) record the car and counterweight masses that were obtained per 8.6.11.10.3(a) during the acceptance test and during any subsequent Category 5 test if required by test method~~

~~(f) contain all subsequent Category 5 results with pass-fail conclusions regarding Code compliance~~

~~(g) remain on site or shall be available to elevator personnel and the authority having jurisdiction.~~))

3028.3 Cleaning and testing of escalators and moving walks. In addition to the periodic inspection and tests specified in Table 3028, escalator and moving walk trusses and pans shall be cleaned every 12 months.

3028.4 Step/skirt test. The step/skirt performance index test specified in 8.6.8.15.19 is required for all periodic escalator tests at intervals specified in Table 3028. An escalator and moving walk step/skirt test shall be performed every 12 months by an elevator mechanic licensed in accordance with 70.87.240 RCW.

3028.5 Firefighters' emergency operation quarterly testing. Testing shall comply with ASME A17.1/CSA B44, 8.6.11.1 as amended below.

8.6.11.1 Firefighters' Emergency Operation. All elevators provided with Firefighters' Emergency Operation shall be subjected ((~~monthly~~)) quarterly, by authorized personnel, to Phase I recall by use of the key switch, and a minimum of one-floor operation on Phase II. Deficiencies shall be reported to, and corrected by, elevator personnel. A record of findings shall be available to elevator personnel and the authority having jurisdiction.

((~~NOTE: See Nonmandatory Appendix AA for additional operation verification~~))

SECTION 3029
REQUIREMENTS FOR MAINTENANCE CONTROL PROGRAM AND REMOTE MONITORING

3029.1 ASME A17.1/CSA B44, 8.6.1 General Maintenance Requirements. Conveyances shall be maintained in accordance with ASME A17.1, 8.6.1 as amended below.

8.6.1.2.1 A written Maintenance Control Program [MCP] shall be in place to maintain the equipment in compliance with the requirements of 8.6. The MCP shall specify examinations, tests, cleaning, lubrication, and adjustments to applicable components at regular intervals (see Section 1.3 for the definition of ("maintenance") and shall comply with the following:

(a) An MCP for each unit (see 8.6.1.1.1) shall be provided by the person(s) and/or firm maintaining the equipment and shall be viewable on-site by elevator personnel at all times from time of acceptance inspection and test or from the time of equipment installation or alteration (see 8.10.1.5).

(b) The MCP shall include, but not be limited to, the Code required maintenance tasks, maintenance tasks, maintenance procedures, and examination and test listed with the associated requirement (see 8.6.4 through 8.6.11). Where maintenance tasks, maintenance procedures, or examinations or tests have been revised in 8.6, the MCP shall be updated.

(c) The MCP shall reference on-site Equipment documentation (see 8.6.1.2.2) needed to fulfill (b) and on-site maintenance records (see 8.6.1.4.1) that record the completion of all associated maintenance tasks specified in 8.6.1.4.1(a).

((~~(d) Where the MCP is maintained remotely from the machine room, machinery space, control room, or control space (see 8.11.1.8), instructions for on-site locating or viewing the MCP either in hard copy or in electronic formal shall be posted on the controller or at the means necessary for test (see 2.7.6.4). The instructions shall be permanently legible with characters a minimum of 3 mm (0.125 in.) high.~~)) The MCP shall be posted in the machine room, machinery place or control room.

(e) The specified scheduled maintenance intervals (see 1.3) shall, as applicable, be based on

(1) equipment age, condition, and accumulated wear

(2) design and inherent quality of the equipment

(3) usage

(4) environmental conditions

(5) improved technology

(6) the manufacturer's recommendations and original equipment certification for any SIL rated devices or circuits (see 8.6.3.12 and 8.7.1.9)

(7) the manufacturer's recommendations based on any ASME A17.7/CSA B44.7 approved components or functions

8.6.1.2.2 On-Site Documentation. The documents specified in (a), through (c) shall be written and permanently kept on-site in the machine room, machinery space, control room, ((~~control space, or the means necessary for test (2.7.6.4)~~)) in hard copy for each unit for elevator personnel.

The documentation specified in (d) shall be on-site and available to the specified personnel.

(a) Up-to-date wiring diagrams detailing circuits of all electrical protective devices (see 2.26.2) and critical operating circuits (see 2.26.3)

(b) Procedures for inspections and tests not described in ASME A17.2 and procedures or methods required for elevator personnel to perform maintenance, repairs, replacements, and adjustments, as follows:

(1) all procedures specifically identified in the Code as required to be written (e.g., 8.6.4.20.8, check out procedure for leveling; 8.6.5.16.5, check out procedure for overspeed valve; and 8.6.8.15.7, check out procedure for reversal stop switch)

(2) unique maintenance procedures or methods required for inspection, tests, and replacement of SIL rated E/E/PES electrical protective devices and circuits [See 2.26.4.3.2, 2.26.9.3.2(b), 2.26.9.5.1(b), and 2.26.9.6.1(b).]

(3) unique maintenance procedures or methods required for inspection, tests, and replacement of equipment applied under alternative arrangements (see 1.2.2.1) shall be provided by the manufacturer or installer

(4) unique maintenance procedures or unique methods required for inspection and test of equipment specified in an ASME A17.7/CSA B44.7, code compliance document (CCD)

(5) procedures for tests, periodic inspections, maintenance, replacements, adjustments, and repairs for traction-loss detection means, broken-suspension-member detection means, residual-strength detection means, and related circuits [See 2.20.8.1 through 2.20.8.3, 8.6.4.19.12, 8.6.11.11, 8.10.2.2(cc)(4)(-c)(-s), and 8.10.2.2.2(ss).]

(c) Written checkout procedures

(1) for elastomeric buffers (see 8.6.4.4.2)

(2) to demonstrate E/E/PES function as intended (see 8.6.4.19.10)

(3) for two-way communication means (see 8.6.4.19.15)

(4) for elevator leveling speed with open doors (see 8.6.4.20.8)

(5) for hydraulic elevator overspeed valve (see 8.6.5.16.5)

(6) for escalator reversal stopping device (see 8.6.8.15.7)

(7) for escalator handrail retarding force (see 8.6.8.15.13)

(d) Written procedures for the following:

(1) evacuation procedures for elevators by authorized persons and emergency personnel shall be available on-site (see 8.6.11.5.2 and ASME A17.4)

(2) the procedure for cleaning of a car and hoistway transparent enclosures by authorized persons (see 8.6.11.4.2)

(e) USI(s) of the executable software associated with the relevant functions in 2.26.1.7.1 and 3.26.11.1 [see also 2.26.1.7.3].

(f) The documentation for the engineering test of skirt panels deflection for units installed or altered under A17.1-2019 and later editions [see 8.3.15.3).

8.6.1.2.3 Where a detective part directly affecting the safety of the operation is identified, the equipment shall be taken out of service until the defective part has been adjusted, repaired, or replaced.

8.6.1.3 Maintenance Personnel. Maintenance, repairs, replacements, and tests shall be performed only by elevator personnel [see 1.3].

8.6.1.4 Maintenance Records. Maintenance records shall document compliance with 8.6. Instructions for locating the maintenance records of each unit, for viewing on-site, shall be posted on the controller or at the means necessary for test (see 2.7.6.4). The provided instructions shall be permanently legible with characters a minimum of 3 mm (0.125 in.) high. These records shall be retained for the most recent 5 yr or from the date of installation or adoption of this Code edition, whichever is less or as specified by the authority having jurisdiction. Existing maintenance records up to 5 yr shall be retained.

8.6.1.4.1 On-Site Maintenance Records

(a) *Maintenance Control Program Records*

(1) A record that shall include the maintenance tasks listed with the associated requirements of 8.6 identified in the Maintenance Control Program (8.6.1.2.1), other tests (see 8.6.1.2.2), examinations and adjustments, and the specified scheduled intervals shall be maintained.

(2) The specified scheduled maintenance intervals (see 1.3) shall, as applicable, be based on the criteria given in 8.6.1.2.1(e).

(3) A hard copy of the MCP records shall be viewable on-site by elevator personnel ((~~in either hard copy or electronic format acceptable to the authority having jurisdiction~~)) and shall include, but ((~~are~~)) not be limited to the following:

(a) site name and address

(b) service provider name

(c) conveyance identification (I.D.) and type

(d) date of record

(e) a description of the maintenance task, interval, and associated requirements of 8.6

(f) indication of completion of maintenance task

NOTE: [8.6.1.4.1(a)]: The recommended format for documenting Maintenance Control Program (MCP) records can be found in Nonmandatory Appendix Y. This is only an example format. A specific maintenance MCP that includes all maintenance needs is required for each unit.

(b) *Repair and Replacement Records.* The following repairs and replacements shall be recorded and a hard copy of the repair and replacement record shall be kept on-site for viewing by elevator personnel. ((~~in either hard copy~~)) Records in electronic format may be provided if approved by the *building official.* ((~~or electronic format. Instructions for locating the records of each unit for immediate viewing shall be posted on the controller or at the means necessary for test (see 2.7.6.4).~~)) The provided instructions shall be permanently legible with characters a minimum of 3 mm (0.125 in) in height. The record shall include an explanation of the repair or replacement, date, and name of person(s) and/or firm performing the task. The record of repairs and replacements shall be retained by the owner of the equipment for the most recent 5 yr or from the date of installation or adoption of this Code edition, whichever is less or as specified by the authority having jurisdiction and shall be a permanent record for the installation. ((~~These records may be kept remotely from the site.~~))

(1) Repairs (8.6.2.1 through 8.6.2.5) including repairs of components and devices listed in 8.6.4 through 8.6.10.

(2) Replacements (8.6.3.1 through 8.6.3.11 except 8.6.3.7 and 8.6.3.10) including replacements of components and devices listed in 8.6.4 through 8.6.10.

(3) Where applicable, the USA(s) (2.26.1.7.3) and the associated functions in 2.26.1.7.1 or 3.26.11.1 that are affected.

(c) *Other Records.* The following written records shall be kept on-site for each unit. Instruction for locating the records of each unit. Instructions for locating the records for each unit for immediate viewing shall be posted on the controller or at the means necessary for test (see 2.7.6.4). The provided instructions shall be permanently legible with characters a minimum of 3 mm (0.125 in.) high. These records shall be retained for the most recent 5 yr from of the date of installation or adoption of this Code edition, whichever is less or as specified by the authority having jurisdiction. The record shall include the date and name of person(s) and/or firm performing the task.

(1) A record of oil usage (8.6.5.7).

(2) A record of findings for firefighters' service operation required by 8.6.11.1 with identification of the person(s) that performed the operation.

(3) Periodic tests (see 8.6.1.7) shall be documented or recorded in accordance with 8.6.1.7.2.

(4) Written record to document compliance with replacement criteria specified in ASME A17.6 requirement 1.10.1.1(c).

(d) *Permanent Record.*

(1) A permanent record of the results of all acceptance tests as required by 8.10.1.1.4 and 8.10.1.1.5 shall be kept with the on-site records.

Test tags, complying with 2.16.3.3 for marking plates (except lettering shall be 1.6 mm [0.0625 in]), permanently attached to or adjacent to the controller, shall meet this requirement.

NOTE: This requirement does not apply to equipment installed under ASME A17.1-2010 and earlier editions.

(2) For escalators and moving walks installed or altered under ASME A17.1-2019/CSA B44:19 or later editions, a permanent record of verification of conformance with 6.1.3.3.6 or 6.2.3.3.6 as applicable, for a skirt panel or skirt panel supporting components shall be kept with the on-site maintenance records.

8.6.1.4.2 Call Backs (Trouble Calls). A hard copy record of call backs shall be maintained and shall include the description of reported troubles, dates, time, and corrective action(s) taken that are reported by any means to elevator personnel. These records shall be made available to elevator personnel when performing corrective action. For elevator personnel other than personnel performing the corrective action, records will be available upon request. Instructions on how to report any need for corrective action (trouble calls) to the responsible party shall be posted on the controller or at the means necessary for test (see 2.7.6.4). The instructions shall be permanently legible with characters a minimum of 3 mm (0.125 in.) high.

3029.2 Remote Monitoring and Operation. Elevators and other conveyances found operating with a device that can directly effect a change in its controls from a remote location is prohibited unless it is operated under the direct on-site supervision of a person who is a licensed elevator mechanic in accordance with Section 3003.2.

Note: Remote operation controls, operated by building personnel located within the building, may be installed for security purposes upon prior approval of the *building official.*

CHAPTER 31

SPECIAL CONSTRUCTION

User notes:

About this chapter: *Chapter 31 provides regulations for unique buildings and building elements. Those include buildings such as membrane structures, greenhouses and relocatable buildings. Special elements include pedestrian walkways and tunnels, awnings, canopies and marquees, vehicular gates and solar energy systems.*

Code development reminder: *Code change proposals to sections preceded by the designation [BS] will be considered by the IBC—Structural Code Development Committee during the 2019 (Group B) Code Development Cycle. See explanation on page iv.*

SECTION 3101
GENERAL

[W] 3101.1 Scope. The provisions of this chapter shall govern special building construction including membrane structures, temporary structures, *pedestrian walkways* and tunnels, automatic *vehicular gates*, *awnings* and *canopies*, *marquees*, signs, towers, antennas, relocatable buildings, swimming pool enclosures and safety devices, and solar energy systems and fixed guideway transit and passenger rail systems.

SECTION 3102
MEMBRANE STRUCTURES

3102.1 General. The provisions of Sections 3102.1 through 3102.8 shall apply to air-supported, air-inflated, membrane-covered cable, membrane-covered frame and *tensile membrane structures*, collectively known as membrane structures, erected for a period of 180 days or longer. Those erected for a shorter period of time shall comply with the *International Fire Code*. Membrane structures covering water storage facilities, water clarifiers, water treatment plants, sewage treatment plants, greenhouses and similar facilities not used for human occupancy are required to meet only the requirements of Sections 3102.3.1 and 3102.7. Membrane structures erected on a building, balcony, deck or other structure for any period of time shall comply with this section.

3102.2 Tensile membrane structures and air-supported structures. Tensile membrane structures and air-supported structures, including permanent and temporary structures, shall be designed and constructed in accordance with ASCE 55. The provisions in Sections 3102.3 through 3102.6 shall apply.

[W] 3102.3 Type of construction. Noncombustible membrane structures shall be classified as Type IIB construction. Noncombustible frame or cable-supported structures covered by an approved membrane in accordance with Section 3102.3.1 shall be classified as Type IIB construction. Heavy timber frame-supported structures covered by an *approved* membrane in accordance with Section 3102.3.1 shall be classified as Type IV-HT construction. Other membrane structures shall be classified as Type V construction.

Exception: Plastic less than 30 feet (9144 mm) above any floor used in greenhouses, where occupancy by the general public is not authorized, and for aquaculture pond covers is not required to meet the fire propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701.

3102.3.1 Membrane and interior liner material. Membranes and interior liners shall be either noncombustible as set forth in Section 703.5 or meet the fire propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 and the manufacturer's test protocol.

Exception: Plastic less than 20 mil (0.5 mm) in thickness used in greenhouses, where occupancy by the general public is not authorized, and for aquaculture pond covers is not required to meet the fire propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701.

3102.4 Allowable floor areas. The area of a membrane structure shall not exceed the limitations specified in Section 506.

3102.5 Maximum height. Membrane structures shall not exceed one story nor shall such structures exceed the height limitations in feet specified in Section 504.3.

Exception: Noncombustible membrane structures serving as roofs only.

3102.6 Mixed construction. Membrane structures shall be permitted to be utilized as specified in this section as a portion of buildings of other types of construction. Height and area limits shall be as specified for the type of construction and occupancy of the building.

3102.6.1 Noncombustible membrane. A noncombustible membrane shall be permitted for use as the roof or as a skylight of any building or atrium of a building of any type of construction provided that the membrane is not less than 20 feet (6096 mm) above any floor, balcony or gallery.

[W] 3102.6.1.1 Membrane. A membrane meeting the fire propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 shall be permitted to be used as the roof or as a skylight on buildings of Type IIB, III, IV-HT and V construction, provided that the membrane is not less than 20 feet (6096 mm) above any floor, balcony or gallery.

3102.7 Engineering design. The structure shall be designed and constructed to sustain dead loads; loads due to tension or inflation; live loads including wind, snow or flood and seismic loads and in accordance with Chapter 16.

3102.7.1 Lateral restraint. For membrane-covered frame structures, the membrane shall not be considered to provide lateral restraint in the calculation of the capacities of the frame members.

3102.8 Inflation systems. Air-supported and air-inflated structures shall be provided with primary and auxiliary inflation systems to meet the minimum requirements of Sections 3102.8.1 through 3102.8.3.

3102.8.1 Equipment requirements. The inflation system shall consist of one or more blowers and shall include provisions for automatic control to maintain the required inflation pressures. The system shall be so designed as to prevent overpressurization of the system.

3102.8.1.1 Auxiliary inflation system. In addition to the primary inflation system, in buildings larger than 1,500 square feet (140 m^2) in area, an auxiliary inflation system shall be provided with sufficient capacity to maintain the inflation of the structure in case of primary system failure. The auxiliary inflation system shall operate automatically when there is a loss of internal pressure and when the primary blower system becomes inoperative.

3102.8.1.2 Blower equipment. Blower equipment shall meet all of the following requirements:

1. Blowers shall be powered by continuous-rated motors at the maximum power required for any flow condition as required by the structural design.
2. Blowers shall be provided with inlet screens, belt guards and other protective devices as required by the *building official* to provide protection from injury.
3. Blowers shall be housed within a weather-protecting structure.
4. Blowers shall be equipped with backdraft check dampers to minimize air loss when inoperative.
5. Blower inlets shall be located to provide protection from air contamination. The location of inlets shall be *approved*.

[S] 3102.8.2 ((~~Standby~~)) Legally required standby power. Wherever an auxiliary inflation system is required, an *approved* legally required standby power ((~~generating~~)) system shall be provided. The system shall be equipped with a suitable means for automatically starting the generator set upon failure of the normal electrical service and for automatic transfer and operation of all of the required electrical functions at full power within 60 seconds of such service failure. ((~~Standby~~)) The legally required standby power system shall be capable of operating independently for not less than 4 hours.

3102.8.3 Support provisions. A system capable of supporting the membrane in the event of deflation shall be provided for in air-supported and air-inflated structures having an *occupant load* of 50 or more or where covering a swimming pool regardless of *occupant load*. The support system shall be capable of maintaining membrane structures used as a roof for Type I construction not less than 20 feet (6096 mm) above floor or seating areas. The support system shall be capable of maintaining other membranes not less than 7 feet (2134 mm) above the floor, seating area or surface of the water.

SECTION 3103
TEMPORARY STRUCTURES

[S] 3103.1 ((~~General.~~ ~~The provisions of Sections 3103.1 through 3103.4 shall apply to structures erected for a period of less than 180 days. Tents, umbrella structures and other membrane structures erected for a period of less than 180 days shall comply with the *International Fire Code*. Those erected for a longer period of time shall comply with applicable sections of this code.~~)) See Section 106.13.

[S] ((~~3103.1.1 Conformance.~~ ~~Temporary structures and uses shall conform to the structural strength, fire safety, *means of egress*, accessibility, light, ventilation and sanitary requirements of this code as necessary to ensure public health, safety and general welfare.~~))

[S] ((~~3103.1.2 Permit required.~~ ~~Temporary structures that cover an area greater than 120 square feet (11.16 m^2), including connecting areas or spaces with a common *means of egress* or entrance that are used or intended to be used for the gathering together of 10 or more persons, shall not be erected, operated or maintained for any purpose without obtaining a *permit* from the *building official*.~~))

[S] ((~~3103.2 Construction documents.~~ ~~A *permit* application and *construction documents* shall be submitted for each installation of a temporary structure. The *construction documents* shall include a site plan indicating the location of the temporary structure and information delineating the *means of egress* and the *occupant load*.~~))

[S] ((~~3103.3 Location.~~ ~~Temporary structures shall be located in accordance with the requirements of Table 602 based on the *fire-resistance rating* of the *exterior walls* for the proposed type of construction.~~))

[S] ((~~3103.4 Means of egress.~~ ~~Temporary structures shall conform to the *means of egress* requirements of Chapter 10 and shall have an *exit access* travel distance of 100 feet (30 480 mm) or less.~~))

SECTION 3104
PEDESTRIAN WALKWAYS AND TUNNELS

3104.1 General. This section shall apply to connections between buildings such as *pedestrian walkways* or tunnels, located at, above or below grade level, that are used as a means of travel by persons. The *pedestrian walkway* shall not contribute to the *building area* or the number of *stories* or height of connected buildings.

3104.1.1 Application. Pedestrian walkways shall be designed and constructed in accordance with Sections 3104.2 through 3104.9. Tunnels shall be designed and constructed in accordance with Sections 3104.2 and 3104.10.

3104.2 Separate structures. Buildings connected by *pedestrian walkways* or tunnels shall be considered to be separate structures.

Exceptions:

1. Buildings that are on the same lot and considered as portions of a single building in accordance with Section 503.1.2.
2. For purposes of calculating the number of Type B units required by Chapter 11, structurally connected buildings and buildings with multiple wings shall be considered to be one structure.

3104.3 Construction. The *pedestrian walkway* shall be of noncombustible construction.

Exceptions:

1. Combustible construction shall be permitted where connected buildings are of combustible construction.
2. *Fire-retardant-treated wood*, in accordance with Section 603.1, Item 1.3, shall be permitted for the roof construction of the *pedestrian walkway* where connected buildings are not less than Type I or II construction.

3104.4 Contents. Only materials and decorations *approved* by the *building official* shall be located in the *pedestrian walkway*.

3104.5 Connections of pedestrian walkways to buildings. The connection of a *pedestrian walkway* to a building shall comply with Section 3104.5.1, 3104.5.2, 3104.5.3 or 3104.5.4.

Exception: Buildings that are on the same lot and considered as portions of a single building in accordance with Section 503.1.2.

3104.5.1 Fire barriers. *Pedestrian walkways* shall be separated from the interior of the building by not less than 2-hour *fire barriers* constructed in accordance with Section 707 and Sections 3104.5.1.1 through 3104.5.1.3.

3104.5.1.1 Exterior walls. Exterior walls of buildings connected to *pedestrian walkways* shall be 2-hour fire-resistance rated. This protection shall extend not less than 10 feet (3048 mm) in every direction surrounding the perimeter of the pedestrian walkway.

3104.5.1.2 Openings in exterior walls of connected buildings. Openings in exterior walls required to be fire-resistance rated in accordance with Section 3104.5.1.1 shall be equipped with opening protectives providing a not less than 3/4-hour *fire protection rating* in accordance with Section 716.

3104.5.1.3 Supporting construction. The fire barrier shall be supported by construction as required by Section 707.5.1.

3104.5.2 Alternative separation. The wall separating the *pedestrian walkway* and the building shall comply with Section 3104.5.2.1 or 3104.5.2.2 where:

1. The distance between the connected buildings is more than 10 feet (3048 mm).
2. The *pedestrian walkway* and connected buildings are equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, and the roof of the walkway is not more than 55 feet (16 764 mm) above grade connecting to the fifth, or lower, story above grade plane, of each building.

   Exception: Open parking garages need not be equipped with an automatic sprinkler system.

3104.5.2.1 Passage of smoke. The wall shall be capable of resisting the passage of smoke.

3104.5.2.2 Glass. The wall shall be constructed of a tempered, wired or laminated glass and doors separating the interior of the building from the pedestrian walkway. The glass shall be protected by an *automatic sprinkler system* in accordance with Section 903.3.1.1 that, when actuated, shall completely wet the entire surface of interior sides of the wall or glass. Obstructions shall not be installed between the sprinkler heads and the wall or glass. The glass shall be in a gasketed frame

and installed in such a manner that the framing system will deflect without breaking (loading) the glass before the sprinkler operates.

3104.5.3 Open sides on walkway. Where the distance between the connected buildings is more than 10 feet (3048 mm), the walls at the intersection of the *pedestrian walkway* and each building need not be fire-resistance rated provided that both sidewalls of the pedestrian walkway are not less than 50 percent open with the open area uniformly distributed to prevent the accumulation of smoke and *toxic* gases. The roof of the walkway shall be located not more than 40 feet (12 160 mm) above grade plane, and the walkway shall only be permitted to connect to the third or lower story of each building.

Exception: Where the *pedestrian walkway* is protected with a sprinkler system in accordance with Section 903.3.1.1, the roof of the walkway shall be located not more than 55 feet (16 764 mm) above grade plane and the walkway shall only be permitted to connect to the fifth or lower story of each building.

3104.5.4 Exterior walls greater than 2 hours. Where *exterior walls* of connected buildings are required by Section 705 to have a *fire-resistance rating* greater than 2 hours, the walls at the intersection of the pedestrian walkway and each building need not be fire-resistance rated provided:

1. The *pedestrian walkway* is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1.
2. The roof of the walkway is not located more than 55 feet (16 764 mm) above grade plane and the walkway connects to the fifth, or lower, story above grade plane of each building.

[S] 3104.6 Public way. *Pedestrian walkways* over a *public way* shall comply with Chapter 32 and the Street Use Ordinance, *Seattle Municipal Code* Title 15.

3104.7 Egress. Access shall be provided at all times to a *pedestrian walkway* that serves as a required *exit*.

3104.8 Width. The unobstructed width of *pedestrian walkways* shall be not less than 36 inches (914 mm). The total width shall be not greater than 30 feet (9144 mm).

3104.9 Exit access travel. The length of *exit access* travel shall be 200 feet (60 960 mm) or less.

Exceptions:

1. *Exit access* travel distance on a *pedestrian walkway* equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 shall be 250 feet (76 200 mm) or less.
2. *Exit access* travel distance on a *pedestrian walkway* constructed with both sides not less than 50 percent open shall be 300 feet (91 440 mm) or less.
3. *Exit access* travel distance on a *pedestrian walkway* constructed with both sides not less than 50 percent open, and equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, shall be 400 feet (122 m) or less.

3104.10 Tunneled walkway. Separation between the tunneled walkway and the building to which it is connected shall be not less than 2-hour fire-resistant construction and openings therein shall be protected in accordance with Section 716.

SECTION 3105
AWNINGS AND CANOPIES

[S] ((~~3105.1 General.~~ ~~*Awnings* and *canopies* shall comply with the requirements of Sections 3105.2 and 3105.3 and other applicable sections of this code.~~))

[S] ((~~3105.2 Design and construction.~~ ~~*Awnings* and *canopies* shall be designed and constructed to withstand wind or other lateral loads and live loads as required by Chapter 16 with due allowance for shape, open construction and similar features that relieve the pressures or loads. Structural members shall be protected to prevent deterioration. *Awnings* shall have frames of noncombustible material, *fire-retardant-treated wood*, heavy timber complying with Section 2304.11, or 1-hour construction with combustible or noncombustible covers and shall be either fixed, retractable, folding or collapsible.~~))

[S] ((~~3105.3 Awnings and canopy materials.~~ ~~Awnings and *canopies* shall be provided with an *approved* covering that complies with one of the following:~~

~~1. The fire propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701.~~
~~2. Has a flame spread index not greater than 25 when tested in accordance with ASTM E84 or UL 723.~~
~~3. Meets all of the following criteria when tested in accordance with NFPA 286:~~
~~3.1. During the 40 kW exposure, flames shall not spread to the ceiling.~~
~~3.2. Flashover, as defined in NFPA 286, shall not occur.~~
~~3.3. The flame shall not spread to the outer extremity of the sample on any wall or ceiling.~~
~~3.4. The peak heat release rate throughout the test shall not exceed 800 kW.~~

~~**Exception:** The fire propagation performance and flame spread index requirements shall not apply to awnings installed on detached one- and two-family dwellings.~~))

[S] 3105.1 General. All *awnings* and *canopies* are subject to the requirements of this section. A *marquee* is a type of *canopy* and is subject to this section. *Awnings* and *canopies* containing electrical wiring and light fixtures are also subject to the requirements of the *Seattle Electrical Code*. *Awnings* and *canopies* over a public place shall comply with the *Seattle Municipal Code* Title 15, *Street Use Code*.

[S] 3105.2 Definitions. The following terms are defined in Chapter 2 of this code.

AWNING.

AWNING SIGN.

CANOPY.

CANOPY SIGN.

DISPLAY SURFACE.

FIRE-RETARDANT COVERING.

VENEER.

[S] 3105.2.1 Definitions of "sign" and various types of signs are found in *Seattle Municipal Code*, Title 23, *Land Use Code*, Chapter 84A, Definitions.

[S] 3105.3 Permits.

[S] 3105.3.1 Permits required. No *awning* or *canopy* shall be erected, constructed, altered or structurally revised without a permit issued by the *building official*. A single permit may be issued for installation of all *awnings* or *canopies*, without signs, serving a multi-tenant building. Structural repairs and replacement of *awning* coverings requires a permit.

Signs installed on *awnings* and *canopies* shall have a separate sign permit for each separate business entity.

Each subsequent installation of an *awning*, *canopy* or sign shall require a separate permit.

Exception: Maintenance which is limited to painting, repainting, cleaning and minor repairs does not require a permit.

[S] 3105.3.2 Permit application. To obtain a permit required by this chapter, the applicant shall file an application which includes the following:

1. The address of the proposed *awning* or *canopy* on the building;
2. Specifications, plans and drawings of the structure, site and vicinity plans, and an identification numbering system for the placement of each proposed *awning* or *canopy* on the elevation and plan view drawings;
3. Signature, contact information and City business license number of the building owner;
4. Signature, contact information and City business license number of the business establishment served by the *awning* or *canopy*;
5. Signature, contact information, City business license number, and State contractor or electrical contractor license number of the installer;
6. Electrical connection and illumination information when the *awning* or *canopy* has electrical components; and
7. Permit fee as specified in the *Fee Subtitle*.

[S] 3105.4 Maintenance. Each *awning* and *canopy*, together with their supports, braces, anchors, and signs shall be maintained in good repair and in a proper state of preservation. The surface of all *awnings* and *canopies* shall be kept clean and *awnings* shall be protected with a sealer-type solution. Failure to maintain any *awning*, *canopy* or sign is a violation and subject to the provisions of Section 103 of this code.

[S] 3105.5 Materials. *Awnings* shall have approved *fire-retardant coverings* or shall comply with the requirements in this code for the materials *used*. *Canopy* materials shall meet the standards for the rigid material *used* as required by this code. Frames shall be of materials allowed for the type of construction of the building.

Exception: Aluminum frames are allowed with all construction types.

[S] 3105.5.1 Approval of materials. The *building official* is permitted to require that sufficient technical data be submitted to substantiate the proposed *use* of any materials and is allowed to approve their *use* if it is determined that the evidence submitted is satisfactory for the *use* intended.

[S] 3105.6 Welding. All structural welding shall conform to the requirements of Chapter 20 for aluminum and Chapter 22 for steel.

[S] 3105.7 Electric signs and luminaires. All *electric signs* shall comply with *Seattle Electrical Code* Article 600 and Article 410 for luminaires.

[S] 3105.8 Obstruction of exits, light and ventilation. No portion of the surface or support of an *awning* or *canopy*, including a retracted *awning*, shall be erected, constructed or maintained so as to obstruct any fire escape or standpipe, or any window,

door or opening used as a *means of egress*, or so as to prevent free passage from one part of a roof to any other part of a roof. No *awning*, *canopy*, or portion thereof shall be attached in any form, shape or manner to a fire escape or standpipe, nor be placed in any manner that interferes with any opening providing ventilation or light required by Chapter 12 of this *Code*.

[S] 3105.9 Location. All portions of *awnings* and *canopies* shall be at least 8 feet (2438 mm) above any walking surface immediately below. All portions of *awnings* and *canopies* located over public property shall be at least 8 feet (2438 mm) above grade and at least 2 feet (610 mm) from the curb. *Awnings* and *canopies* shall be located where they will not obstruct, obscure or interfere with any publicly maintained street tree, streetlight or utility pole.

[S] 3105.10 Supports. The supports for *awnings* and *canopies* shall be located on private property.

Exception: Where approved by the Director of Transportation, stanchions for *awnings* located at the entrance to buildings are permitted to be installed on public property if they are located in line with other street furniture. Individual stanchions shall have a cross sectional dimension or diameter no greater than 6 inches (152 mm).

[S] 3105.11 Drainage.

[S] 3105.11.1 Awning drainage. *Awnings* shall shed water uniformly from the *awning* covering.

[S] 3105.11.2 Canopy drainage. *Canopies* draining away from the *building line* shall shed water uniformly over the *canopy* edge. The upper surface of a *canopy* shall be sloped a minimum of 1 unit vertical in 48 units horizontal (2% slope). Approval shall be obtained from the Director of Public Utilities when a *canopy* drains back toward the building and is connected to an infiltration facility, a side sewer or is conveyed under a sidewalk to a gutter.

[S] 3105.12 Design loads. *Awnings* and *canopies* shall be designed and constructed to resist all forces to which they are subject as specified in Chapter 16. Where signs, *electric signs* or luminaires are attached to an *awning* or *canopy* structure, the additional load of all attachments shall be included in the design loads and shall comply with the requirements of Chapter 16 and Section 3107.10.1 of this *Code*.

[S] 3105.13 Pitch. The upper surface of all *awnings* shall have a pitch of at least 30 degrees (0.52 rad) from the horizontal. The *building official* is authorized to approve *awnings* with a smaller pitch when the design is prepared by a licensed structural engineer.

[S] 3105.14 Attachment of awnings and canopies. All *awnings* and *canopies* attached to masonry, concrete, aluminum, or steel shall be safely secured with steel anchors and bolts, or approved expansion bolts of sufficient size and anchorage to support the loads safely. No support or attachment for an *awning* or *canopy* shall be connected to, supported by, or fastened to exterior veneer.

[S] 3105.15 Size. Where an *awning* or *canopy* is located at an exit door from a stairway or *exit passageway* that is fire-resistance rated, the distance the *awning* or *canopy* projects from the building shall be no more than one-half the distance from the walking surface to the lowest point of the bottom of the *awning* or *canopy*.

[S] 3105.16 Approved materials. The *building official* may require that sufficient technical data be submitted to substantiate the proposed *use* of any material; and may approve *use* of the material if the *building official* determined that the evidence submitted is satisfactory for the intended *use*.

[S] 3105.17 Inspections. All *awnings* and *canopies* regulated by this chapter are subject to inspection by the *building official*. The permit holder must request a final inspection within 3 business days of completing the installation.

[S] 3105.18 Footing or foundation inspection. Footings or foundations for *awnings* and *canopies* are subject to inspection by the *building official*. An inspection must be requested and completed before the footing is filled.

[S] 3105.19 Electrical inspection. All electrical wiring is subject to the *Seattle Electrical Code*. Upon energizing any electrical elements, the permit holder must request an inspection within one business day.

SECTION 3106
MARQUEES

[S] 3106.1 General. ((~~Marquees shall comply with Sections 3106.2 through 3106.5 and other applicable sections of this code.~~))
Marquees are, by definition, a *canopy* and shall comply with Section 3105.

[S] ((~~**3106.2 Thickness.** The height or thickness of a marquee measured vertically from its lowest to its highest point shall be not greater than 3 feet (914 mm) where the marquee projects more than two-thirds of the distance from the *lot line* to the curb line, and shall be not greater than 9 feet (2743 mm) where the marquee is less than two-thirds of the distance from the lot line to the curb line.~~))

[S] ((~~**3106.3 Roof construction.** Where the roof or any part thereof is a skylight, the skylight shall comply with the requirements of Chapter 24. Every roof and skylight of a marquee shall be sloped to downspouts that shall conduct any drainage from the marquee in such a manner so as not to spill over the sidewalk.~~))

[S] ((~~3106.4 Location prohibited.~~ ~~Every marquee shall be so located as not to interfere with the operation of any exterior standpipe, and such that the marquee does not obstruct the clear passage of *stairways* or *exit discharge* from the building or the installation or maintenance of street lighting.~~))

[S] ((~~3106.5 Construction.~~ ~~A marquee shall be supported entirely from the building and constructed of noncombustible materials. Marquees shall be designed as required in Chapter 16. Structural members shall be protected to prevent deterioration.~~))

SECTION 3107
SIGNS

[S] ((~~3107.1 General.~~ ~~Signs shall be designed, constructed and maintained in accordance with this code.~~))

[S] 3107.1 General. It is the purpose of this chapter to safeguard the life, health, property and welfare of people within the City by regulating and controlling the design, quality of materials, construction, location, illumination, and maintenance of signs and *sign structures* that are visible from any portion of public places and rights-of-way.

[S] 3107.2 Enforcement.

[S] 3107.2.1 Authority. The Director of Transportation and the *building official* shall enforce the provisions of this chapter as it relates to signs located over public places. "Public places" is defined in Section 15.02.046 of the *Seattle Municipal Code*, *Street and Sidewalk Use*. The *building official* shall enforce the provisions of this chapter as it relates to signs located over all other property in the City of Seattle.

[S] 3107.2.2 Other requirements. All signs shall comply with any additional sign regulations imposed by *Seattle Municipal Code* Title 23, *Land Use Code*, and Title 15, *Street Use Code*, and other City regulations, even when no permit is required. Signs having electrical wiring and light fixtures are subject to the requirements of the *Seattle Electrical Code.*

[S] 3107.3 Definitions

[S] 3107.3.1 Definitions – Building Code. The following definitions are found in Chapter 2 of this *Code*:

AWNING SIGN.

CANOPY SIGN.

DISPLAY SURFACE.

NONSTRUCTURAL TRIM.

PROJECTING SIGN.

PROJECTION.

SIGN STRUCTURE.

VENEER.

[S] 3107.3.2 Definitions – Land Use Code. The following sign-related definitions are found in the Seattle *Land Use Code* Chapter 23.84A:

ELECTRIC SIGN.

ON-PREMISES SIGN.

PROJECTING SIGN.

ROOF SIGN.

SIGN.

WALL SIGN.

[S] 3107.4 Permits.

[S] 3107.4.1 Permits required. Except as otherwise specifically provided in this section, a permit shall be obtained from the *building official* before any sign is erected, constructed, posted, applied, or altered.

A permit must be obtained for:

1. All signs viewable from public rights of way, except signs considered temporary signs by the *Land Use Code* Section 23.55.
2. All *electric signs*.
3. A new permit is required for existing signs when a different business entity uses the sign.
4. Any *display surface* greater than 5 square feet (0.46 m^2) in area.

5. Signs located within the interior of the building that are not visible from the public right-of-way when:
   5.1. The sign is mounted within the interior of a covered or open mall of a multi-tenant retail facility and the sign is located over or adjoining the pedestrian walking surface; or
   5.2. When the sign is greater than 5 square feet (0.46 m^2) in area; or
   5.3 When it is an *electric sign*.
6. Existing signs that are removed and reinstalled.
7. Signs that are refurbished, retro-fitted, relocated or field-assembled.

[S] 3107.4.2 Work exempt from permit. A sign permit is not required for:

1. Changes made to the message copy installed on the *display surface* of a sign when the *sign structure* is lawfully erected and is specifically designed for using manually replaceable copy.
2. Maintenance which is limited to painting, repainting, cleaning and minor repairs.
3. Signs for public facilities that indicate danger or that provide service or safety information and are not greater than 24 square feet (2.23 square meters).

[S] 3107.4.3 Temporary signs. The erection, re-erection, construction, posting or placement of temporary signs that are allowed by Section 23.55.012 of the *Land Use Code* do not require a sign permit. The owner of a temporary sign is responsible for compliance with the provisions of this section and other applicable laws or codes regulating signs, and for the removal of any temporary sign at the end of the allowed term. Failure to comply with the requirements of either this *Code* or the *Land Use Code* is a violation and subject to the provisions of Section 103 of this *Code* and the provisions of Chapter 23.91 of the *Land Use Code.*

[S] 3107.4.4 Maximum number of signs. Temporary signs allowed by Section 23.55.012 of the *Land Use Code* and signs not requiring a permit as specified in Section 3107.4.1 of this *Code* are not counted as part of the maximum number of signs allowed under Chapter 23.55 of the *Land Use Code*.

[S] 3107.4.5 Attachments to signs. Ancillary devices, displays and attachments, that are not part of the original sign design for which a permit was issued, shall not be added to an existing sign except as provided Chapter 23.55 of the *Land Use Code* and requires a new permit issued by the *building official*.

Where ancillary devices, displays, *electric signs* or luminaires are attached to a *sign structure*, the additional load of all attachments shall be included in the design loads and shall comply with the requirements of Chapter 16 and Section 3107.10 of this *Code*.

[S] 3107.5 Permit application. To obtain a sign permit, the applicant shall submit an application to the Department which provides the following information:

1. The address of the proposed sign installation;
2. Specifications, plans and drawings of the structure, site and vicinity, and a numbering system that identifies the placement of each proposed sign on the elevation and plan view drawings;
3. Signature, contact information and City business license number of the building owner;
4. Signature, contact information and City business license number of the business establishment served by the sign or *awning sign*;
5. Signature, contact information, City business license number, and State contractor or electrical contractor license number of the installer;
6. Electrical connection and illumination information when the sign has electrical components; and
7. Permit fee as specified in the *Fee Subtitle*.

Note: Electrical permits are required for *electric signs* pursuant to the *Seattle Electrical Code*, and street use permits shall be obtained from the Department of Transportation for signs over any public place pursuant to the *Street Use Code*. Review and approval by the Department of Neighborhoods is required for signs located on the site of a *historic building*, or in a *landmark* or special review district.

[S] 3107.6 Inspections. All signs regulated by this chapter are subject to inspection by the *building official*, including sign footings, refurbished or relocated used signs and retrofitted and field-assembled signs. The permit holder must request a final inspection within 3 business days of completing the installation. The *building official* may require an inspection of any temporary sign to ensure public safety.

[S] 3107.6.1 Electrical sign inspection. All electrical wiring is subject to the *Seattle Electrical Code.* Upon energizing an *electrical sign*, the permit holder must request an inspection within one business day.

[S] 3107.6.2 Sign footing inspection. Footings for all signs greater than 5 square feet (0.46 m^2) in area require a footing inspection. An inspection must be requested and completed before the footing is filled.

[S] 3107.7 Maintenance and closure of business.

[S] 3107.7.1 Maintenance. The owners of signs shall maintain their signs, together with all supports, braces, guys and anchors, in good repair and in a proper state of preservation. The owners shall keep *display surfaces* of all signs neatly painted or posted at all times. Failure to maintain any sign, *display surface* or *sign structure* and the component parts is a violation and subject to the provisions of Section 103 of this *Code*.

[S] 3107.7.2 Closure of business and abandoned signs. Upon the closure and vacation of a business or activity, the operator of the business or activity is responsible for removing all related signs within 90 days from the date of closure. If the operator fails to remove any sign and the business or activity is not resumed during the 90-day period, then the owner of the premises upon which the signs are located is responsible and must remove all signs within 180 days from the date of closure and vacation of the business or activity.

Note: A new permit is required for existing signs when a different business entity uses the sign. See Section 3107.4.

[S] 3107.8 Nonconforming signs. Maintenance to keep a nonconforming sign in good condition is required. Minor structural or electrical additions or alterations deemed to be necessary for public safety may be authorized by the *building official*. A nonconforming sign, for the purpose of this C*ode*, is a sign or any portion of a sign which, because of its location or construction, could not lawfully be reconstructed in its present location.

[S] 3107.9 General requirements.

[S] 3107.9.1 General. All signs shall conform to the requirements of this section.

[S] 3107.9.2 Clearance from overhead electrical conductors. Signs shall be located no closer than 3 feet (914 mm) horizontally or 8 feet (2438 mm) vertically from overhead electrical conductors which are energized at 1000 volts or less and not less than 10 feet (3048 mm) in any direction from overhead conductors energized at more than 1000 volts.

Exception: Overhead conductors enclosed in an approved raceway or enclosure.

[S] 3107.9.3 Clearance from fire escapes, exits or standpipes. No sign or *sign structure* shall be erected in such a manner that any portion of its surface or supports will interfere in any way with the free use of any fire escape, exit or standpipe.

[S] 3107.9.4 Obstruction of exits, light and ventilation. No portion of the surface or support of any sign shall be erected, constructed or maintained so as to obstruct any fire escape or standpipe, or any window, door or opening used as a *means of egress*, or so as to prevent free passage from one part of a roof to any other part of the roof. No sign, or portion of a sign, shall be attached in any form, shape or manner to a fire escape or standpipe, nor be placed in such a manner as to interfere with any opening providing the ventilation or light required by Chapter 12 of this *Code*.

[S] 3107.9.5 Supporting members. Signs mounted on and attached to buildings shall be so designed and mounted that secondary structural members shall be incorporated into and become a part of the sign display. Exterior bracing such as angle irons, guy wires, cables and similar devices are permitted only where no other reasonable method of fastening consistent with safety is possible.

[S] 3107.9.6 Non-display surfaces. If a sign is visible from more than one direction, all areas not intended as a *display surface* including the back and sides, shall be designed so the non-*display surfaces* are given a finished appearance and the *display surface* is visible only from the direction that it is intended to be seen.

[S] 3107.9.7 Electrical permit sticker. Each *electrical sign* shall display the electrical permit sticker issued with the sign permit. The sticker shall be located where it is clearly visible without use of a ladder and without requiring access into a building, unless otherwise authorized by the *building official*.

[S] 3107.9.8 Labels. Every permanent sign shall display the name of the sign erector or manufacturer. Electrical signs must display listing labels required by the *Seattle Electrical Code*.

[S] 3107.10 Design.

[S] 3107.10.1 General. Signs and *sign structures* shall be designed and constructed to resist all forces to which they are subject as specified in Chapter 16 and this section. All signs shall be designed and installed to transfer all forces directly to the structural frame of the building or structure. The overturning moment produced from lateral forces shall in no case exceed two-thirds of the dead load resisting moment. Uplifts due to overturning shall be adequately resisted by proper anchorage to the ground or to the structural frame of the building. The weight of earth superimposed over footings is permitted to be used in determining the dead load resisting moment. Such earth shall be carefully placed and thoroughly compacted.

[S] 3107.10.2 Wind and seismic loads. Signs and *sign structures* shall be designed and constructed to resist wind and seismic forces as specified in Chapter 16 of this *Code*.

[S] 3107.10.3 Allowable stresses. The design of wood, concrete, steel or aluminum members shall conform to the requirements of Chapters 19, 20, 22 and 23. Loads, both vertical and horizontal, exerted on the soil shall not produce stresses exceeding those specified in Chapter 16 of this *Code*. The working stresses of wire rope and its fastenings shall not exceed 25 percent of the ultimate strength of the rope or fasteners.

[S] 3107.11 Construction.

[S] 3107.11.1 General. The supports for all signs and *sign structures* shall be placed in or upon private property and shall be securely built, constructed, and erected in conformance with the requirements of this chapter. All structural welding on signs and *sign structures* shall conform to the requirements of Chapter 20 for aluminum and Chapter 22 for steel.

[S] 3107.11.2 Materials. Materials for construction of signs and *sign structures* shall be:

1. Of a quality and grade allowed by specific chapters in this *Code* for the materials proposed; or
2. Listed or rated for the proposed *use*; or
3. Approved by the *building official*.

[S] 3107.11.3 Approved materials. The *building official* may require that sufficient technical data be submitted to substantiate the proposed *use* of any material; and may approve *use* of the material when the *building official* determines that the evidence submitted is satisfactory for the intended *use*.

[S] 3107.11.4 Anchorage. Members supporting unbraced signs shall be so proportioned that the bearing loads imposed on the soil in either direction, horizontal or vertical, shall not exceed the design requirements.

Braced ground signs shall be anchored to resist the specified wind or seismic load acting in any direction. Anchors and supports shall be designed for safe bearing loads on the soil and for an effective resistance to pull-out amounting to a force 25 percent greater than the required resistance to overturning.

Signs attached to masonry, concrete or steel shall be safely and securely fastened thereto by means of metal anchors, bolts or approved expansion screws of sufficient size and anchorage to support safely the loads applied. No wooden blocks or plugs or anchors with wood used in connection with screws or nails is considered proper anchorage except in the case of signs attached to wood framing.

No lead plugs or anchors shall be used to support signs. No anchor or support of any sign shall be connected to or supported by an unbraced parapet wall unless the wall is designed or braced for the added forces.

[S] 3107.12 Roof signs.

[S] 3107.12.1 General. *Roof signs* shall be constructed of approved material as specified in Section 3107.11. The sign shall be secured and anchored to the structural frame of the building.

[S] 3107.12.2 Clear passage. A passage clear of all obstructions shall be left under or around, and immediately adjacent to, signs exceeding a height of 4 feet (1219 mm) above the roof. The passage shall not be less than 3 feet (914 mm) wide and 4 feet (1219 mm) high and shall be at parapet or roof level. There shall be one clear passage opening as follows:

1. One for each *roof sign*.
2. One for every 50 lineal feet (15 240 mm) of horizontally running *sign structure*.
3. Within 20 feet (6096 mm) of walls and parapets when *roof signs* are at right angles to a face of the building.

[S] 3107.13 Electrical signs.

[S] 3107.13.1 Construction. Structures supporting *electrical signs* shall comply with Section 3107.11 of this *Code*.

[S] 3107.13.2 Installation. Electrical signs and branch circuits supplying power to *electric signs* shall be installed in accordance with the Article 600 of the *Seattle Electrical Code*.

[S] 3107.13.3 Inspections. The permit holder must request a final inspection within 3 business days of completing the installation or within one business day upon energizing an *electrical sign*.

SECTION 3108
TELECOMMUNICATION AND BROADCAST TOWERS

[BS] 3108.1 General. Towers shall be designed and constructed in accordance with the provisions of TIA-222. Towers shall be designed for seismic loads; exceptions related to seismic design listed in Section 2.7.3 of TIA-222 shall not apply. In Section 2.6.6.2 of TIA 222, the horizontal extent of Topographic Category 2, escarpments, shall be 16 times the height of the escarpment.

Exception: Single free-standing poles used to support antennas not greater than 75 feet (22 860 mm), measured from the top of the pole to grade, shall not be required to be noncombustible.

[BS] 3108.2 Location and access. Towers shall be located such that guy wires and other accessories shall not cross or encroach on any street or other public space, or over above-ground electric utility lines, or encroach on any privately owned property without the written consent of the owner of the encroached-upon property, space or above-ground electric utility lines. Towers shall be equipped with climbing and working facilities in compliance with TIA-222. Access to the tower sites shall be limited as required by applicable OSHA, FCC and EPA regulations.

SECTION 3109
SWIMMING POOLS, SPAS AND HOT TUBS

[W] 3109.1 General. The design and construction of swimming pools, spas and ((~~hot tubs~~)) other aquatic recreation facilities shall comply with the *International Swimming Pool and Spa Code*, ((~~.~~)) where the facility is one of the following:

1. For the sole use of residents and invited guests at a single-family *dwelling*;
2. For the sole use of residents and invited guests of a duplex owned by the residents;
3. Operated exclusively for physical therapy or rehabilitation and under the supervision of licensed medical practitioner.

All other "water recreation facilities" as defined in RCW 70.90.110 are regulated under chapters 246-260 and 246-262 WAC.

SECTION 3110
AUTOMATIC VEHICULAR GATES

3110.1 General. *Automatic vehicular gates* shall comply with the requirements of Sections 3110.2 and 3110.3 and other applicable sections of this code.

3110.2 Vehicular gates intended for automation. *Vehicular gates* intended for automation shall be designed, constructed and installed to comply with the requirements of ASTM F2200.

3110.3 Vehicular gate openers. *Vehicular gate* openers, where provided, shall be *listed* in accordance with UL 325.

SECTION 3111
SOLAR ENERGY SYSTEMS

3111.1 General. Solar energy systems shall comply with the requirements of this section.

3111.1.1 Wind resistance. Rooftop-mounted photovoltaic panels and modules and solar thermal collectors shall be designed in accordance with Section 1609.

3111.1.2 Roof live load. Roof structures that provide support for solar energy systems shall be designed in accordance with Section 1607.13.5.

3111.2 Solar thermal systems. Solar thermal systems shall be designed and installed in accordance with Section 2606.12, the *International Plumbing Code*, the *International Mechanical Code* and the *International Fire Code.*

3111.2.1 Equipment. Solar thermal systems and components shall be *listed* and *labeled* in accordance with ICC 900/SRCC 300 and ICC 901/SRCC 100.

3111.3 Photovoltaic solar energy systems. Photovoltaic solar energy systems shall be designed and installed in accordance with this section, the *International Fire Code*, NFPA 70 and the manufacturer's installation instructions.

3111.3.1 Equipment. Photovoltaic panels and modules shall be *listed* and *labeled* in accordance with UL 1703. Inverters shall be *listed* and *labeled* in accordance with UL 1741. Systems connected to the utility grid shall use inverters *listed* for utility interaction.

3111.3.2 Fire classification. Rooftop-mounted photovoltaic systems shall have a fire classification in accordance with Section 1505.9. Building-integrated photovoltaic systems shall have a fire classification in accordance with Section 1505.8.

3111.3.3 Building-integrated photovoltaic systems. Building-integrated photovoltaic systems that serve as roof coverings shall be designed and installed in accordance with Section 1507.18.

3111.3.4 Access and pathways. Roof access, pathways and spacing requirements shall be provided in accordance with Section 1204 of the *International Fire Code.*

3111.3.5 Ground-mounted photovoltaic systems. Ground-mounted photovoltaic systems shall be designed and installed in accordance with Chapter 16 and the *International Fire Code.*

3111.3.5.1 Fire separation distances. Ground-mounted photovoltaic systems shall be subject to the fire separation distance requirements determined by the local jurisdiction.

[W] SECTION 3114
FIXED GUIDEWAY TRANSIT AND PASSENGER RAIL SYSTEMS

3114.1 Fixed guideway transit and passenger rail systems. Construction of fixed guideway transit and passenger rail systems shall be in accordance with NFPA 130-17, standard for fixed guideway transit and passenger rail systems.

3114.2 Means of egress. The means of egress for fixed guideway transit and passenger rail systems shall be in accordance with NFPA 130-17.

CHAPTER 32

ENCROACHMENTS INTO THE PUBLIC RIGHT-OF-WAY

User note:

About this chapter: *From time to time it is necessary or appropriate for a portion of a building to encroach onto an adjoining public right-of-way. Chapter 32 establishes parameters for such encroachments not only at grade but also above and below grade.*

SECTION 3201
GENERAL

3201.1 Scope. The provisions of this chapter shall govern the encroachment of structures into the public right-of-way.

3201.2 Measurement. The projection of any structure or portion thereof shall be the distance measured horizontally from the *lot line* to the outermost point of the projection.

3201.3 Other laws. The provisions of this chapter shall not be construed to permit the violation of other laws or ordinances regulating the use and occupancy of public property.

[S] ((~~3201.4 Drainage.~~ ~~Drainage water collected from a roof, *awning*, canopy or marquee, and condensate from mechanical equipment shall not flow over a public walking surface.~~))

[S] 3201.4 Approval of encroachments. All encroachments of buildings and structures on, over or under sidewalks, streets and other public places are subject to approval by the Director of Transportation and the *building official*. Encroachments shall comply with this code and other applicable codes including Seattle Municipal Code, Title 15.

[S] 3201.5 Doors and gates. No door or gate in any position shall project over public property.

[S] 3201.6 Materials. Structures and appendages regulated by this code shall be constructed of materials specified in this code for structures on private property.

[S] ((~~SECTION 3202~~
~~ENCROACHMENTS~~

~~**3202.1 Encroachments below grade.** Encroachments below grade shall comply with Sections 3202.1.1 through 3202.1.3.~~

~~**3202.1.1 Structural support.** A part of a building erected below grade that is necessary for structural support of the building or structure shall not project beyond the *lot lines*, except that the footings of street walls or their supports that are located not less than 8 feet (2438 mm) below grade shall not project more than 12 inches (305 mm) beyond the street *lot line*.~~

~~**3202.1.2 Vaults and other enclosed spaces.** The construction and utilization of vaults and other enclosed spaces below grade shall be subject to the terms and conditions of the applicable governing authority.~~

~~**3202.1.3 Areaways.** Areaways shall be protected by grates, *guards* or other *approved* means.~~

~~**3202.2 Encroachments above grade and below 8 feet in height.** Encroachments into the public right-of-way above grade and below 8 feet (2438 mm) in height shall be prohibited except as provided for in Sections 3202.2.1 through 3202.2.3. Doors and windows shall not open or project into the public right-of-way.~~

~~**3202.2.1 Steps.** Steps shall not project more than 12 inches (305 mm) and shall be guarded by *approved* devices not less than 3 feet (914 mm) in height, or shall be located between columns or pilasters.~~

~~**3202.2.2 Architectural features.** Columns or pilasters, including bases and moldings, shall not project more than 12 inches (305 mm). Belt courses, lintels, sills, architraves, pediments and similar architectural features shall not project more than 4 inches (102 mm).~~

~~**3202.2.3 Awnings.** The vertical clearance from the public right-of-way to the lowest part of any *awning*, including valances, shall be not less than 7 feet (2134 mm).~~

~~**3202.3 Encroachments 8 feet or more above grade.** Encroachments 8 feet (2438 mm) or more above grade shall comply with Sections 3202.3.1 through 3202.3.4.~~

~~**3202.3.1 Awnings, canopies, marquees and signs.** *Awnings*, canopies, marquees and signs shall be constructed so as to support applicable loads as specified in Chapter 16. *Awnings*, canopies, marquees and signs with less than 15 feet (4572 mm) of clearance above the sidewalk shall not extend into or occupy more than two-thirds the width of the sidewalk measured from~~

~~the building. Stanchions or columns that support *awnings*, canopies, marquees and signs shall be located not less than 2 feet (610 mm) in from the curb line.~~

~~**3202.3.2 Windows, balconies, architectural features and mechanical equipment.** Where the vertical clearance above grade to projecting windows, balconies, architectural features or mechanical equipment is more than 8 feet (2438 mm), 1 inch (25 mm) of encroachment is permitted for each additional 1 inch (25 mm) of clearance above 8 feet (2438 mm), but the maximum encroachment shall be 4 feet (1219 mm).~~

~~**3202.3.3 Encroachments 15 feet or more above grade.** Encroachments 15 feet (4572 mm) or more above grade shall not be limited.~~

~~**3202.3.4 Pedestrian walkways.** The installation of a pedestrian walkway over a public right-of-way shall be subject to the approval of the applicable governing authority. The vertical clearance from the public right-of-way to the lowest part of a *pedestrian walkway* shall be not less than 15 feet (4572 mm).~~

~~**3202.4 Temporary encroachments.** Where allowed by the applicable governing authority, vestibules and storm enclosures shall not be erected for a period of time exceeding 7 months in any 1 year and shall not encroach more than 3 feet (914 mm) nor more than one-fourth of the width of the sidewalk beyond the street *lot line*. Temporary entrance *awnings* shall be erected with a clearance of not less than 7 feet (2134 mm) to the lowest portion of the hood or *awning* where supported on removable steel or other *approved* noncombustible support.~~))

CHAPTER 33

SAFEGUARDS DURING CONSTRUCTION

User notes:

About this chapter: *While the balance of the chapters in this code specify how a building is to be designed and constructed in order to be in compliance with the code, Chapter 33 looks to the actual construction process. Parameters are provided for demolition and for protecting adjacent property during demolition and construction. Issues such as how to provide egress while the building is growing, the timing of standpipe and sprinkler installation, and protection of pedestrians are addressed.*

Code development reminder: *Code change proposals to sections preceded by the designation [BS] will be considered by the IBC—Structural Code Development Committee during the 2019 (Group B) Code Development Cycle. See explanation on page iv.*

SECTION 3301
GENERAL

3301.1 Scope. The provisions of this chapter shall govern safety during construction and the protection of adjacent public and private properties.

3301.2 Storage and placement. Construction equipment and materials shall be stored and placed so as not to endanger the public, the workers or adjoining property for the duration of the construction project.

SECTION 3302
CONSTRUCTION SAFEGUARDS

3302.1 Alterations, repairs and additions. Required *exits*, existing structural elements, fire protection devices and sanitary safeguards shall be maintained at all times during *alterations*, *repairs* or *additions* to any building or structure.

Exceptions:

1. Where such required elements or devices are being altered or repaired, adequate substitute provisions shall be made.
2. Maintenance of such elements and devices is not required where the existing building is not occupied.

3302.2 Manner of removal. Waste materials shall be removed in a manner that prevents injury or damage to persons, adjoining properties and public rights-of-way.

3302.3 Fire safety during construction. Fire safety during construction shall comply with the applicable requirements of this code and the applicable provisions of Chapter 33 of the *International Fire Code.*

SECTION 3303
DEMOLITION

3303.1 Construction documents. *Construction documents* and a schedule for demolition shall be submitted where required by the *building official*. Where such information is required, work shall not be done until such *construction documents* or schedule, or both, are *approved*.

[S] 3303.2 Pedestrian protection. The work of demolishing any building shall not be commenced until pedestrian protection is in place as required by this chapter and the Street Use Ordinance, *Seattle Municipal Code* Title 15.

3303.3 Means of egress. A *horizontal exit* shall not be destroyed unless and until a substitute *means of egress* has been provided and *approved*.

[S] ((~~3303.4 Vacant lot.~~ ~~Where a structure has been demolished or removed, the vacant lot shall be filled and maintained to the existing grade or in accordance with the ordinances of the jurisdiction having authority.~~))

[S] 3303.4 Surface condition and fill. The site shall be left level and free of debris upon completion of demolition, and all holes shall be filled or protected with secure fences. Holes are permitted to be filled with concrete, rocks or other nondecaying material no larger than 12 inches (305 mm) in diameter. Wood and other organic material shall not be buried on the site.

Leaving the site level means:

1. The grade conforms to that existing on all sides;
2. Surface water will drain off;
3. Surface is smooth; and

4. Broken sections of the foundation or other material are not exposed.

The site shall be seeded upon completion of the demolition if it is to be left vacant for more than 6 months.

3303.5 Water accumulation. Provision shall be made to prevent the accumulation of water or damage to any foundations on the premises or the adjoining property.

[S] 3303.6 Utility connections. Service utility connections shall be discontinued and capped in accordance with ((~~the *approved* rules and the requirements of the applicable governing authority~~)) requirements of the governing utility or agency including, but not limited to, Seattle Public Utilities, Seattle Department of Transportation, Seattle Fire Department, Seattle City Light, Puget Sound Energy and CenturyLink.

3303.7 Fire safety during demolition. Fire safety during demolition shall comply with the applicable requirements of this code and the applicable provisions of Chapter 33 of the *International Fire Code*.

[S] 3303.8 Removal of hazardous and combustible materials. All asbestos and other hazardous material shall be removed prior to demolition, in accordance with regulations of the Environmental Protection Agency, the Puget Sound Clean Air Agency and other pertinent agencies. Combustible waste shall be removed in accordance with the *International Fire Code*. During demolition, streets and sidewalks shall be left clean at the end of each day's operation.

[S] 3303.9 Welding and cutting. Welding and cutting shall be performed in accordance with the *International Fire Code*.

[S] 3303.10 Erosion and sediment control. Provision shall be made to stabilize ground conditions to eliminate dust and erosion. Demolition sites shall comply with *Seattle Municipal Code* Title 22 Subtitle VIII, the *Seattle Stormwater Code* and *Seattle Municipal Code* Chapter 22.170, the *Seattle Grading Code*.

[S] 3303.11 Drainage. If the demolition will result in a change of drainage patterns, the flow of all watercourses, including streams, ditches, drains, combined sewers and runoff, intercepted during the progress of the work, shall be returned to the condition present before the demolition or as specified on the permit, and in accordance with *Seattle Municipal Code* Title 22 Subtitle VIII, the *Seattle Stormwater Code* and *Seattle Municipal Code* Chapter 22.170, the *Seattle Grading Code*, respectively.

[S] 3303.12 Foundations and footings. All concrete or masonry floors, foundations, footings, basement walls and retaining walls not to be reused shall be removed to 18 inches (457 mm) below final grade. All concrete floors left in place shall be broken so as to allow water to drain through unless the floors are to be used.

[S] 3303.13 Engineer's report. The *building official* is permitted to require a structural engineer's analysis of proposed demolition or any portions of a structure remaining after demolition.

[S] 3303.14 Underground tanks. When demolition occurs, all underground tanks on the site shall either be removed or filled, as required by the *International Fire Code*.

[S] 3303.15 Rat eradication program. All applicants for a demolition permit shall initiate a rat eradication program on the project site at least 15 days prior to the start of demolition or any clearing or grading activity on the demolition site.

[S] 3303.15.1 Duration of rat eradication program. The rat eradication program must continue at least until demolition begins. No demolition or clearing or grading on the demolition site shall begin until the rat eradication program is complete unless approved by the *building official*. The rat eradication program may be terminated or waived by the *building official* when supported by a written recommendation of a licensed pest control agent.

[S] 3303.15.2 Requirements of rat eradication program. The rat eradication program shall be approved by a qualified pest control agent and shall comply with the Seattle-King County Public Health Department guidelines and recommendations for rat baiting. The use of any pesticide shall comply with WAC 16-228-1380. The *building official* may require additional deterrent measures on recommendation of the Seattle-King County Public Health Department.

[S] 3303.15.3 Demolition permit. The *building official* shall not issue any demolition permit until the applicant has provided a copy of the rat eradication program and a declaration that the requirements of Section 3303.15 have been or will be complied with prior to the start of demolition.

SECTION 3304
SITE WORK

3304.1 Excavation and fill. Excavation and fill for buildings and structures shall be constructed or protected so as not to endanger life or property. Stumps and roots shall be removed from the soil to a depth of not less than 12 inches (305 mm) below the surface of the ground in the area to be occupied by the building. Wood forms that have been used in placing concrete, if within the ground or between foundation sills and the ground, shall be removed before a building is occupied or used for any purpose. Before completion, loose or casual wood shall be removed from direct contact with the ground under the building.

3304.1.1 Slope limits. Slopes for permanent fill shall be not steeper than one unit vertical in two units horizontal (50-percent slope). Cut slopes for permanent excavations shall be not steeper than one unit vertical in two units horizontal (50-percent

slope). Deviation from the foregoing limitations for cut slopes shall be permitted only upon the presentation of a soil investigation report acceptable to the *building official*.

3304.1.2 Surcharge. Fill or other surcharge loads shall not be placed adjacent to any building or structure unless such building or structure is capable of withstanding the additional loads caused by the fill or surcharge. Existing footings or foundations that can be affected by any excavation shall be underpinned adequately or otherwise protected against settlement and shall be protected against lateral movement.

[S] ((~~3304.1.3 Footings on adjacent slopes.~~ ~~For footings on adjacent slopes, see Chapter 18.~~))

3304.1.4 Fill supporting foundations. Fill to be used to support the foundations of any building or structure shall comply with Section 1804.6. *Special inspections* of compacted fill shall be in accordance with Section 1705.6.

[W] 3304.1.5 Fire watch during construction. Where required by the fire code official, a fire watch shall be provided during nonworking hours for new construction that exceeds 40 feet (12,192 mm) in height above the lowest adjacent grade.

EXCEPTIONS:

1. New construction that is built under the IRC.
2. New construction less than 5 stories and 50,000 square feet per story.

SECTION 3305
SANITARY

[S] 3305.1 Facilities required. Sanitary facilities shall be provided during construction, remodeling or demolition activities in accordance with the ((~~*International*~~)) *Uniform Plumbing Code.*

SECTION 3306
PROTECTION OF PEDESTRIANS

[S][BS] 3306.1 Protection required. ((~~Pedestrians shall be protected during construction, remodeling and demolition activities as required by this chapter and Table 3306.1. Signs shall be provided to direct pedestrian traffic.~~)) The protection of the public and of the sidewalks, streets and other public property during construction or demolition shall be provided as required by the Street Use Ordinance, *Seattle Municipal Code* Title 15.

[S] ((~~TABLE 3306.1~~
~~PROTECTION OF PEDESTRIANS~~

~~HEIGHT OF CONSTRUCTION~~	~~DISTANCE FROM CONSTRUCTION TO LOT LINE~~	~~TYPE OF PROTECTION REQUIRED~~
~~8 feet or less~~	~~Less than 5 feet~~	~~Construction railings~~
	~~5 feet or more~~	~~None~~
~~More than 8 feet~~	~~Less than 5 feet~~	~~Barrier and covered walkway~~
	~~5 feet or more, but not more than one-fourth the height of construction~~	~~Barrier and covered walkway~~
	~~5 feet or more, but between one-fourth and one-half the height of construction~~	~~Barrier~~
	~~5 feet or more, but exceeding one-half the height of construction~~	~~None~~

~~For SI: 1 foot = 304.8 mm.~~))

[S] ((~~[BS] 3306.2 Walkways.~~ ~~A walkway shall be provided for pedestrian travel in front of every construction and demolition site unless the applicable governing authority authorizes the sidewalk to be fenced or closed. A walkway shall be provided for pedestrian travel that leads from a *building* entrance or exit of an occupied structure to a public way.Walkways shall be of sufficient width to accommodate the pedestrian traffic, but shall be not less than 4 feet (1219 mm) in width. Walkways shall be provided with a durable walking surface. Walkways shall be *accessible* in accordance with Chapter 11 and shall be designed to support all imposed loads, and the design live load shall be not less than 150 pounds per square foot (psf) (7.2 kN/m^2).~~))

[S] ((~~[BS] 3306.3 Directional barricades.~~ ~~Pedestrian traffic shall be protected by a directional barricade where the walkway extends into the street. The directional barricade shall be of sufficient size and construction to direct vehicular traffic away from the pedestrian path.~~))

[S] ((~~[BS] 3306.4 Construction railings.~~ ~~Construction railings shall be not less than 42 inches (1067 mm) in height and shall be sufficient to direct pedestrians around construction areas.~~))

[S] ((~~[BS] 3306.5 Barriers.~~ ~~Barriers shall be not less than 8 feet (2438 mm) in height and shall be placed on the side of the walkway nearest the construction. Barriers shall extend the entire length of the construction site. Openings in such barriers shall be protected by doors that are normally kept closed.~~))

[S] ((~~[BS] 3306.6 Barrier design.~~ ~~Barriers shall be designed to resist loads required in Chapter 16 unless constructed as follows:~~

1. ~~Barriers shall be provided with 2-inch by 4-inch (51 mm by 102 mm) top and bottom plates.~~
2. ~~The barrier material shall be boards not less than 3/4-inch (19.1 mm) thick or wood structural panels not less than 1/4-inch (6.4 mm) thick.~~
3. ~~Wood structural use panels shall be bonded with an adhesive identical to that for exterior wood structural use panels.~~
4. ~~Wood structural use panels 1/4 inch (6.4 mm) or 5/16 inch (23.8 mm) in thickness shall have studs spaced not more than 2 feet (610 mm) on center.~~
5. ~~Wood structural use panels 3/8 inch (9.5 mm) or 1/2 inch (12.7 mm) in thickness shall have studs spaced not more than 4 feet (1219 mm) on center provided that a 2-inch by 4-inch (51 mm by 102 mm) stiffener is placed horizontally at mid-height where the stud spacing is greater than 2 feet (610 mm) on center.~~
6. ~~Wood structural use panels 5/8 inch (15.9 mm) or thicker shall not span over 8 feet (2438 mm).~~

[S] ((~~[BS] 3306.7 Covered walkways.~~ ~~Covered walkways shall have a clear height of not less than 8 feet (2438 mm) as measured from the floor surface to the canopy overhead. Adequate lighting shall be provided at all times. Covered walkways shall be designed to support all imposed loads. The design live load shall be not less than 150 psf (7.2 kN/m²) for the entire structure.~~

~~**Exception:** Roofs and supporting structures of covered walkways for new, light-frame construction not exceeding two *stories* above *grade plane* are permitted to be designed for a live load of 75 psf (3.6kN/m²) or the loads imposed on them, whichever is greater. In lieu of such designs, the roof and supporting structure of a covered walkway are permitted to be constructed as follows:~~

1. ~~Footings shall be continuous 2-inch by 6-inch (51 mm by 152 mm) members.~~
2. ~~Posts not less than 4 inches by 6 inches (102 mm by 152 mm) shall be provided on both sides of the roof and spaced not more than 12 feet (3658 mm) on center.~~
3. ~~Stringers not less than 4 inches by 12 inches (102 mm by 305 mm) shall be placed on edge upon the posts.~~
4. ~~Joists resting on the stringers shall be not less than 2 inches by 8 inches (51 mm by 203 mm) and shall be spaced not more than 2 feet (610 mm) on center.~~
5. ~~The deck shall be planks not less than 2 inches (51 mm) thick or wood structural panels with an exterior exposure durability classification not less than 23/32 inch (18.3 mm) thick nailed to the joists.~~
6. ~~Each post shall be knee braced to joists and stringers by members not less than 2 inches by 4 inches (51 mm by 102 mm); 4 feet (1219 mm) in length.~~
7. ~~A curb that is not less than 2 inches by 4 inches (51 mm by 102 mm) shall be set on edge along the outside edge of the deck.~~))

[S] ((~~[BS] 3306.8 Repair, maintenance and removal.~~ ~~Pedestrian protection required by this chapter shall be maintained in place and kept in good order for the entire length of time pedestrians are subject to being endangered. The *owner* or the *owner's* authorized agent, on completion of the construction activity, shall immediately remove walkways, debris and other obstructions and leave such public property in as good a condition as it was before such work was commenced.~~))

[S] ((~~[BS] 3306.9 Adjacent to excavations.~~ ~~Every excavation on a site located 5 feet (1524 mm) or less from the street *lot line* shall be enclosed with a barrier not less than 6 feet (1829 mm) in height. Where located more than 5 feet (1524 mm) from the street *lot line*, a barrier shall be erected where required by the *building official*. Barriers shall be of adequate strength to resist wind pressure as specified in Chapter 16.~~))

SECTION 3307
PROTECTION OF ADJOINING PROPERTY

[S][BS] 3307.1 Protection required. Adjoining public and private property shall be protected from damage during construction, remodeling and demolition work. Protection shall be provided for footings, foundations, party walls, chimneys, skylights and roofs. Provisions shall be made to control water runoff and erosion during construction or demolition activities. ((~~The person making or causing an excavation to be made shall provide written notice to the *owners* of adjoining buildings advising them that the excavation is to be made and that the adjoining buildings should be protected. Said notification shall be delivered not less than 10 days prior to the scheduled starting date of the excavation.~~)) When the existing grade of a site is altered by filling, excavating, dredging or moving of earth materials, the *owner* shall protect all adjoining property during construction from encroachment or collapse by sloping the sides of the temporary grading at a slope that is safe and not more than one horizontal to one vertical. In addition, adjoining property shall be protected from encroachment or collapse by sloping the sides of the permanent

grading at a slope not greater than two horizontal to one vertical. The *building official* is authorized to approve temporary or permanent slopes that are steeper based on a design by an experienced geotechnical engineer.

In areas of known unsuitable soils, the *building official* is authorized to require slopes that are less steep to assure protection of adjoining property.

SECTION 3308
TEMPORARY USE OF STREETS, ALLEYS AND PUBLIC PROPERTY

((~~**3308.1 Storage and handling of materials.** The temporary use of streets or public property for the storage or handling of materials or of equipment required for construction or demolition, and the protection provided to the public shall comply with the provisions of the applicable governing authority and this chapter.~~))

[S] 3308.1 General. Temporary use of streets, alleys and public property shall comply with the Street Use Ordinance, Seattle Municipal Code Title 15.

[S] ((~~**3308.1.1 Obstructions.** Construction materials and equipment shall not be placed or stored so as to obstruct access to fire hydrants, standpipes, fire or police alarm boxes, catch basins or manholes, nor shall such material or equipment be located within 20 feet (6096 mm) of a street intersection, or placed so as to obstruct normal observations of traffic signals or to hinder the use of public transit loading platforms.~~))

[S] ((~~**3308.2 Utility fixtures.** Building materials, fences, sheds or any obstruction of any kind shall not be placed so as to obstruct free approach to any fire hydrant, fire department connection, utility pole, manhole, fire alarm box or catch basin, or so as to interfere with the passage of water in the gutter. Protection against damage shall be provided to such utility fixtures during the progress of the work, but sight of them shall not be obstructed.~~))

SECTION 3309
FIRE EXTINGUISHERS

[F] 3309.1 Where required. Structures under construction, *alteration* or demolition shall be provided with not fewer than one *approved* portable fire extinguisher in accordance with Section 906 and sized for not less than ordinary hazard as follows:

1. At each *stairway* on all floor levels where combustible materials have accumulated.
2. In every storage and construction shed.
3. Additional portable fire extinguishers shall be provided where special hazards exist, such as the storage and use of flammable and combustible liquids.

[F] 3309.2 Fire hazards. The provisions of this code and the *International Fire Code* shall be strictly observed to safeguard against all fire hazards attendant upon construction operations.

SECTION 3310
MEANS OF EGRESS

3310.1 Stairways required. Where building construction exceeds 40 feet (12 192 mm) in height above the lowest level of fire department vehicle access, a temporary or permanent stairway shall be provided. As construction progresses, such stairway shall be extended to within one floor of the highest point of construction having secured decking or flooring.

[F] 3310.2 Maintenance of means of egress. *Means of egress* and required *accessible means of egress* shall be maintained at all times during construction, demolition, remodeling or *alterations* and *additions* to any building.

Exception: Existing means of egress need not be maintained where a*pproved* temporary *means of egress* systems and facilities are provided.

[S] 3310.3 Stairway floor number signs. Temporary stairway floor number signs shall be provided in accordance with the requirements of Section 1023.9.

SECTION 3311
STANDPIPES

[F] 3311.1 Where required. In buildings required to have standpipes by Section 905.3.1, not fewer than one standpipe shall be provided for use during construction. Such standpipes shall be installed prior to construction exceeding 40 feet (12 192 mm) in height above the lowest level of fire department vehicle access. Such standpipes shall be provided with fire department hose connections at locations adjacent to *stairways* complying with Section 3310.1. As construction progresses, such standpipes shall be extended to within one floor of the highest point of construction having secured decking or flooring.

[F] 3311.2 Buildings being demolished. Where a building is being demolished and a standpipe exists within such a building, such standpipe shall be maintained in an operable condition so as to be available for use by the fire department. Such standpipe shall be demolished with the building but shall not be demolished more than one floor below the floor being demolished.

[F] 3311.3 Detailed requirements. Standpipes shall be installed in accordance with the provisions of Chapter 9.

Exception: Standpipes shall be either temporary or permanent in nature, and with or without a water supply, provided that such standpipes conform to the requirements of Section 905 as to capacity, outlets and materials.

SECTION 3312
AUTOMATIC SPRINKLER SYSTEM

[S][F] 3312.1 Completion before occupancy. In buildings where an *automatic sprinkler system* is required by this code, it shall be unlawful to occupy any portion of a building or structure until the *automatic sprinkler system* installation has been tested and *approved*, ((~~except as provided in Section 111.3~~)) unless *approved* by the *building official*.

[F] 3312.2 Operation of valves. Operation of sprinkler control valves shall be permitted only by properly authorized personnel and shall be accompanied by notification of duly designated parties. When the sprinkler protection is being regularly turned off and on to facilitate connection of newly completed segments, the sprinkler control valves shall be checked at the end of each work period to ascertain that protection is in service.

SECTION 3313
WATER SUPPLY FOR FIRE PROTECTION

[F] 3313.1 Where required. An *approved* water supply for fire protection, either temporary or permanent, shall be made available as soon as combustible material arrives on the site.

SECTION 3314
FIRE WATCH DURING CONSTRUCTON

[F] 3314.1 Fire watch during combustible construction. Where required by the *fire code official*, a fire watch shall be provided during nonworking hours for construction that exceeds 40 feet (12 192 mm) in height above the lowest adjacent grade.

[S] SECTION 3315
CONSTRUCTION MATERIAL MANAGEMENT

[S] 3315.1 Storage and handling of materials. Materials stored and handled on site during construction shall comply with the manufacturer's printed instructions. Where manufacturer's printed instructions are not available, approved standards or guidelines shall be followed.

[S] 3315.2 Construction phase moisture control. Porous or fibrous materials and other materials subject to moisture damage shall be protected from moisture during construction. Material damaged by moisture or that is visibly colonized by fungi either prior to delivery or during construction shall be cleaned and dried or, where damage cannot be corrected by such means, shall be removed and replaced.

APA—continued

APA PDS Supplement 4—12: Design and Fabrication of Plywood Sandwich Panels (revised 2013)
2306.1

APA PDS Supplement 5—16: Design and Fabrication of All-plywood Beams (revised 2013)
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APA S475—16: Glued Laminated Beam Design Tables
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APA S560—14: Field Notching and Drilling of Glued Laminated Timber Beams
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APA T300—16: Glulam Connection Details
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APA X450—01: Glulam in Residential Construction—Western Edition
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ASABE

American Society of Agricultural and Biological Engineers
2950 Niles Road
St. Joseph, MI 49085

EP 484.3 MON2016: Diaphragm Design of Metal-clad, Wood-frame Rectangular Buildings
2306.1

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ASCE/SEI

American Society of Civil Engineers
Structural Engineering Institute
1801 Alexander Bell Drive
Reston, VA 20191-4400

7—16: Minimum Design Loads and Associated Criteria for Buildings and Other Structures
202, Table 1504.1.1, Table 1504.8, 1602.1, 1604.3, Table 1604.3, 1604.5, Table 1604.5, 1604.8.2, 1604.9, 1605.1, 1605.2.1, 1605.3.1, 1605.3.1.2, 1605.3.2, 1605.3.2.1, 1607.8.1, 1607.8.1.1, 1607.8.1.2, 1607.9, 1607.13.1, 1607.13.3.1, 1608.1, 1608.2, 1608.3, 1609.1.1, 1609.2, 1609.3, 1609.5.1, 1609.5.3, 1611.2, 1612.2, 1613.1, 1613.2.2, 1613.2.3, 1613.2.5, Table 1613.2.3(1), Table 1613.2.3(2), 1613.2.5.1, 1613.2.5.2, 1613.3, 1614.1, 1615.1, 1705.12, 1705.12.1.1, 1705.12.1.2, 1705.12.4, 1705.13.1.1, 1705.13.1.2, 1705.13.2, 1705.13.3, 1705.13.4, 1709.5, 1803.5.12, 1808.3.1, 1809.13, 1810.3.6.1, 1810.3.8.3.2, 1810.3.8.3.3, 1810.3.9.4, 1810.3.11.2, 1810.3.12, 1901.2, 1905.1.1, 1905.1.2, 1905.1.7, 1905.1.8, 2205.2.1.1, 2205.2.1.2, 2205.2.2, 2206.2.1, 2209.1, 2209.2, 2210.2, 2211.1.1.1, Table 2304.6.1, Table 2306.3(3), Table 2308.7.5, 2404.1, 2505.1, 2505.2, 2506.2.1

8—02: Standard Specification for the Design of Cold-formed Stainless Steel Structural Members
1604.3.3, 2210.1, 2210.2

19—16: Structural Applications of Steel Cables for Buildings
2208.1

24—14: Flood Resistant Design and Construction
1202.4.2, 1202.4.4, 1612.4, 1612.5, 2702.1.8, 3001.3

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17—17: Standard for Dry Chemical Extinguishing Systems
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17A—17: Standard for Wet Chemical Extinguishing Systems
904.5, 904.12

20—16: Standard for the Installation of Stationary Pumps for Fire Protection
412.2.4.1, 913.1, 913.2, 913.2.1, 913.5

30—18: Flammable and Combustible Liquids Code
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30A—18: Code for Motor Fuel Dispensing Facilities and Repair Garages
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31—16: Standard for the Installation of Oil-burning Equipment
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32—16: Standard for Dry Cleaning Plants
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40—16: Standard for the Storage and Handling of Cellulose Nitrate Film
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45—15: Standard on Fire Protection Laboratories Using Chemicals (2015 Edition)
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58—17: Liquefied Petroleum Gas Code
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61—17: Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Product Facilities
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70—17: National Electrical Code
108.3, 406.2.7, 406.2.9, 412.5.7, 415.11.1.8, Table 509, 904.3.1, 907.6.1, 909.12.2, 909.16.3, 910.4.6, 1204.4.1, 2701.1, 2702.1.3, 3111.3

72—16: National Fire Alarm and Signaling Code
407.4.4.3, 407.4.4.5, 407.4.4.5.1, 901.6, 903.4.1, 904.3.5, 907.1.2, 907.2, 907.2.6, 907.2.9.3, 907.2.10, 907.2.12.2, 907.3, 907.3.3, 907.3.4, 907.5.2.1.2, 907.5.2.2, 907.5.2.2.5, 907.6, 907.6.1, 907.6.2, 907.6.6, 907.7, 907.7.1, 907.7.2, 911.1.6, 917.1, 2702.2.4, 3005.5, 3007.7

80—16: Standard for Fire Doors and Other Opening Protectives
410.2.5, 509.4.2, 716.1, 716.2.5.1, 716.2.6.4, 716.2.9, 716.3.4.1, 716.3.5, 1010.1.4.3

82—14: Standard on Incinerators and Waste and Linen Handling Systems and Equipment
713.13

85—15: Boiler and Combustion System Hazards Code
426.1

92—15: Standard for Smoke Control Systems
909.7, 909.8

99—18: Health Care Facilities Code
407.11, 422.6, 425.1

101—18: Life Safety Code
1029.6.2

105—16: Standard for Smoke Door Assemblies and Other Opening Protectives
405.4.2, 710.5.2.2, 716.2.10, 909.20.4.1

110—16: Standard for Emergency and Standby Power Systems
2702.1.3

111—13: Standard on Stored Electrical Energy Emergency and Standby Power Systems
2702.1.3

120—15: Standard for Fire Prevention and Control in Coal Mines
426.1

130—17: Standard for Fixed Guideway Transit and Guideway Transit and Passenger Rail Systems
3101.1, 3114

170—18: Standard for Fire Safety and Emergency Symbols
1025.2.6.1

UL—continued

2034—2008: Single- and Multiple-station Carbon Monoxide Alarms—with Revisions through March 2015
915.4.2, 915.4.4

2075—2013: Standard for Gas and Vapor Detectors and Sensors
915.5.1, 915.5.3

2079—04: Tests for Fire Resistance of Building Joint Systems—with Revisions through August 2015
202, 715.3, 715.6

2196—2001: Tests for Fire Resistive Cables—with Revisions through March 2012
909.20.6.1, 913.2.2, 2702.3, ((~~3007.8.1~~)) 403.6.2.9, 3008.8.2

2200—2012: Stationary Engine Generator Assemblies—with Revisions through July 2015
2702.1.1

2202—2009: Electric Vehicle (EV) Charging System Equipment
406.2.7

2594—2013: Electric Vehicle Supply Equipment
406.2.7

2703—2014: Outline of Investigation for Mounting Systems, Mounting Devices, Clamping/Retention Devices and Ground Lugs for Use with Flat-plate Photovoltaic Modules and Panels
1505.9

ULC

Underwriters Laboratories of Canada
13775 Commerce Parkway
Richmond, BC V6V 2V4

CAN/ULC S 102.2—2010: Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies—with 2000 Revisions
720.2, 720.3, 720.4

USC

United States Code
c/o Superintendent of Documents
U.S. Government Printing Office
732 North Capitol Street NW
Washington, DC 20401

18 USC Part 1, Ch.40: Importation, Manufacture, Distribution and Storage of Explosive Materials
202

WCLIB

West Coast Lumber Inspection Bureau
P.O. Box 23145
Portland, OR 97281

AITC 104—03: Typical Construction Details
2306.1

AITC 110—01: Standard Appearance Grades for Structural Glued Laminated Timber
2306.1

AITC 113—10: Standard for Dimensions of Structural Glued Laminated Timber
2306.1

AITC 119—96: Standard Specifications for Structural Glued Laminated Timber of Hardwood Species
2306.1

AITC 200—09: Manufacturing Quality Control Systems Manual for Structural Glued Laminated Timber
2306.1

ARTICLE 80
Administration

Informational note: Article 80 is comprised entirely of amendments made by The City of Seattle to the National Electrical Code (NEC). It aligns the administration and enforcement of this Code with administrative chapters found in other construction codes adopted by The City of Seattle.

I. Title, Purpose and Scope

80.1 Title. These regulations shall be known as the "*Seattle Electrical Code*," may be cited as such, and are referred to herein as "this Code." All references to the *National Electrical Code* contained in this Code mean the *Seattle Electrical Code*.

(A) Referenced Codes. The code provisions and standards referenced in this *Code* are considered part of this *Code* to the extent prescribed by each such reference. Where differences occur between provisions of this *Code* and referenced codes and standards, the provisions of this *Code* govern.

(B) Metric Units. Whenever in this *Code* there is a conflict between metric units of measurement and U.S. customary units, the U.S. customary units govern.

80.2 Purpose.

(A) Protection from Hazards. The purpose of this code is to provide minimum standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation, or equipment or systems utilizing electricity within the City.

This *Code* is intended to provide for and promote the health, safety, and welfare of the general public, and not to create or otherwise establish or designate any particular class or group of persons who will or should be especially protected or benefited by the terms of this *Code*.

This *Code* is not intended as a design specification nor an instruction manual for untrained persons.

(B) Chapter 296-46B Washington Administrative Code. An additional purpose of this *Code* is to provide equal, higher or better standards of construction and equal, higher or better standards of materials, devices, appliances, and equipment than those required by the State of Washington under the provisions of Revised Code of Washington (RCW) Chapter 19.28. Only those sections of the Washington State Electrical Code adopted in 2020 amending the 2020 *National Electric Code*, as set forth at Chapter 296-46B of the Washington Administrative Code (hereinafter WAC) and specifically incorporated in this *Code* are adopted. Informational Notes providing the WAC rule number, as the source of the Seattle amendment, are informational only.

80.3 Scope. This Code applies to the installation, *alteration*, repair, relocation, replacement, addition to, use, or maintenance of electrical wiring, systems, and equipment, including communications systems and traffic management systems, within the City. The design and testing of *equipment* regulated by this Code are subject to the approval of the authority having jurisdiction.

(A) Traffic Management Systems. Traffic management systems provide signalization for controlling vehicular traffic, pedestrian traffic, or rolling stock. 2020 WAC 296-46B-010(16) through (23) are adopted as follows:

Traffic Management Systems.

(16) The department or city authorized to do electrical inspections will perform the electrical inspection and acceptance of traffic management systems within its jurisdiction. A traffic management system includes:

(a) Traffic illumination systems;

(b) Traffic signal systems;

(c) Traffic monitoring systems;

(d) The electrical service cabinet and all related components and equipment installed on the load side of the service cabinet supplying electrical power to the traffic management system; and

(e) Signalization system(s) necessary for the operation of a light rail system.

A traffic management system can provide signalization for controlling vehicular traffic, pedestrian traffic, or rolling stock.

(17) The department or city authorized to do electrical inspections recognizes that traffic signal conductors, pole and bracket cables, signal displays, traffic signal controllers/cabinets and associated components used in traffic management systems are acceptable for the purpose of meeting the requirements of chapter 19.28 RCW provided they conform with the following standards or are listed on the Washington state department of transportation (WSDOT) qualified products list.

(a) WSDOT/APWA standard specifications and plans;

(b) WSDOT Design Manual;

(c) International Municipal Signal Association (IMSA);

(d) National Electrical Manufacturer's Association (NEMA);

(e) Federal Standards 170/Controller Cabinets;

(f) Manual for Uniform Road, Bridge, and Municipal Construction;

(g) Institute of Transportation Engineers (ITE); or

(h) Manual of Uniform Traffic Control Devices (MUTCD).

(18) Associated induction detection loop or similar circuits will be accepted by the department or city authorized to do electrical inspections without inspection.

(19) For the licensing requirements of chapter 19.28 RCW, jurisdictions will be considered owners of traffic management systems when doing electrical work for another jurisdiction(s) under a valid interlocal agreement, as permitted by chapter 39.34 RCW. Interlocal agreements for traffic management systems must be filed with the department or city authorized to do electrical inspections prior to work being performed for this provision to apply.

(20) Jurisdictions, with an established electrical inspection authority, and WSDOT may perform electrical inspection on their rights of way for each other by interlocal agreement. They may not perform electrical inspection on other rights of way except as allowed in chapter 19.28 or 39.34 RCW.

(21) Underground installations.

(a) In other than open trenching, raceways will be considered "fished" according to the NEC and do not require visual inspection.

(b) The department or city authorized to do electrical inspections will conduct inspections in open trenching within its jurisdiction. The electrical work permit purchaser must coordinate the electrical inspection. A written request (e.g., letter, email, fax, etc.) for inspection, made to the department or city authorized to do electrical inspections office having the responsibility to perform the inspection, must be made a minimum of two working days prior to the day inspection is needed (e.g., two working days 10:00 a.m. Tuesday request for a 10:00 a.m. Thursday inspection, excluding holidays and weekends).

If, after proper written request, the department or city authorized to do electrical inspections fails to make an electrical inspection at the time requested, underground conduit may be covered after inspection by the local government jurisdiction's project inspector/designee. Written documentation of a local government jurisdiction inspection must be provided to the department or city authorized to do electrical inspections when requested. Written documentation will include:

(i) Date and time of inspection;

(ii) Location;

(iii) Installing firm;

(iv) Owner;

(v) Type of conduit;

(vi) Size of conduit;

(vii) Depth of conduit; and

(viii) Project inspector/designee name and contact information.

(22) Identification of traffic management system components. Local government jurisdictions or WSDOT may act as the certifying authority for the safety evaluation of all components.

(a) An electrical service cabinet must contain only listed components. The electrical service cabinet enclosure is not required to be listed but will conform to the standards in subsection (17) of this section.

(b) The local government jurisdiction must identify, as acceptable, the controller cabinet or system component(s) with an identification plate. The identification plate must be located inside the cabinet and may be attached with adhesive.

(23) Conductors of different circuits in same cable, enclosure, or raceway. All traffic management system circuits will be permitted to occupy the same cable, enclosure, or raceway without regard to voltage characteristics, provided all conductors are insulated for the maximum voltage of any conductor in the cable, enclosure, or raceway.

(B) Interlocal Agreement. Pursuant to the licensing requirements of RCW chapter 19.28, jurisdictions are considered owners of traffic management systems when doing electrical work for another jurisdiction(s) under a valid interlocal agreement, as allowed by RCW chapter 39.34:

(1) Interlocal agreements for traffic management systems must be filed with the department or city authorized to do electrical inspections prior to work being performed.

(2) The City of Seattle, as the authority having jurisdiction to perform electrical inspections, and WSDOT may perform electrical inspections for each other on their rights-of-way by interlocal agreement. They may not perform electrical inspection on other rights-of-way except as allowed in RCW chapters 19.28 or 39.34.

(C) Not Covered. This Code does not cover the following:

(1) Installations in ships and watercraft not connected to public utilities, railway rolling stock, aircraft or automotive vehicles.

(2) Installations of railways or generation, transformation, transmission, or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communication purposes.

(3) Installations of communication equipment under exclusive control of communication utilities, located outdoors or in building spaces used exclusively for such installations.

(4) Installations under the exclusive control of electric utilities for the purpose of communication, metering, or for the generation, control, transformation, transmission, and distribution of electric energy located in buildings used for such purposes or leased by the utility or on public highways, streets, roads, or other public ways, or outdoors on established rights on private property up to the service point as defined in this Code. The installation and maintenance of all utility owned conductors up to the service point, as defined by this Code, shall be the responsibility of the serving utility.

(5) Installations underground in mines and self-propelled mobile surface mining machinery and its attendant electrical trailing cable.

(D) Vesting of electrical permit applications. An electrical permit application shall be considered under the Seattle Electrical code in effect on a date vesting occurs pursuant to as provided below, or on a date as otherwise required by law.

(1) Electrical permit applications shall be considered under the Seattle Electrical Code in effect on the date vesting occurs pursuant to Seattle Building Code Section 101.3 if any of Items a. through c. apply:

a. The electrical permit application is for work directly associated with a building permit and is submitted separately from the building permit application; or

b. The electrical permit application is for initial tenant alterations and is submitted no later than 18 months after the date of the approved final inspection for the building, and is submitted before the expiration date of the building permit for the Tenant alteration, as determined by Seattle Building Code Section 106.9; or

c. Electrical permit applications other than those subject to Item 1 shall be considered under the codes in effect on the date a complete electrical permit application is submitted that complies with all the requirements of Section 80.51.

80.4 Application to Existing Electrical Systems.

(A) Additions, Alterations, Renovations, or Repairs. Additions, *alterations,* renovations, or repairs may be made to any electrical system without requiring the existing electrical system to comply with the requirements of this Code, if the addition, *alteration,* renovation, or repair conforms to the standards required for a new electrical system. Additions, *alterations,* renovations, or repairs shall not cause an existing system to become *unsafe,* unhealthy, or overloaded. This section does not limit the effect of applicable retroactive ordinances.

Exception: Subject to the approval of the authority having jurisdiction, repairs may be made with the same materials of which the building or structure is constructed, other than for the replacement of receptacles as provided in NEC Section 406.3(D), provided the repair complies with the electrical code in effect at the time of original installation and provided further that no change shall be permitted which increases its hazard.

(B) Existing Electrical Installations. Electrical systems lawful at the time of the adoption of this *Code* may continue in use, be maintained or repaired, or have components replaced if the use, maintenance, repair, or component replacement occurs in accordance with system design and specifications of the original system, and no hazard to life, health, or property is likely to result.

If changes are required for correction of hazards, the authority having jurisdiction may approve a compliance schedule for such work.

Informational Note: WAC 296-46B-010(14) requirements for adding, altering, or repairing electrical installations in existing buildings are incorporated herein with edits.

(C) Changes in Building Occupancy. Electrical systems that are part of a building or structure undergoing a change in occupancy as defined in the *Seattle Building Code* shall comply with all requirements of this Code that are applicable to the new occupancy group or use.

(D) Maintenance. All electrical systems, materials, *equipment,* appurtenances, and all parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe and hazard-free condition. All devices or safeguards that were required by a code in effect when the electrical system was installed shall be maintained in conformance with the code edition under which installed. The owner or the owner's authorized agent shall be responsible for maintenance of electrical systems and *equipment.*

(E) Moved Buildings. Electrical permits for electrical work performed on a building or structure moved into or within the City shall be obtained from the authority having jurisdiction. The authority having jurisdiction will inspect the electrical system for deficiencies and issue corrections. Deficiencies shall be corrected before a certificate of occupancy will be issued.

The service to a moved building or structure shall comply with this *Code*. Other than the service, a building or structure moved into or within the City is not required to comply with this *Code* if the original occupancy classification of the building or structure is not changed. A building or structure that undergoes a substantial alteration as defined in Section 304.1.1 of the *Seattle Existing Building Code* and a building or structure wired by standards other than those recognized by this *Code* and the *National Electrical Code* shall comply with this *Code*.

Any moved building that is not in compliance within one year from the date of permit issuance and is found to be a public nuisance may be abated.

Informational Note: For the definition of *Occupancy Classification*, see Chapter 3 of the *Seattle Building Code*.

(F) Landmarks—Historic Buildings and Structures. The authority having jurisdiction may modify the specific requirements of this *Code* as it applies to landmarks and require in lieu thereof alternate requirements that, in the

opinion of the authority having jurisdiction, will result in a reasonable degree of safety to the public and the occupants of those buildings.

For purposes of this *Code*, a landmark building is a building or structure:

(1) that is subject to a requirement to obtain a certificate of approval from the City Landmarks Preservation Board before altering or making changes to specific features or characteristics;

(2) that has been nominated for designation and the City Landmarks Preservation Board has not issued a determination regarding designation;

(3) that has been designated for preservation by the State of Washington or by the City Landmarks Preservation Board;

(4) that has been listed or determined eligible to be listed in the National Register of Historic Places; or

80.6 Utilization Equipment and Alternative Materials and Methods of Wiring. This *Code* does not prevent the use of any utilization equipment, material, method, or design of wiring not specifically allowed or prohibited by this *Code*, provided the same has been approved and its use authorized by the authority having jurisdiction.

The authority having jurisdiction may approve an *alternative*, provided the proposed alternative complies with the provisions of this *Code* and the alternative, when considered together with other safety features or relevant circumstances, will provide at least an equivalent level of strength, effectiveness, fire resistance, durability, safety, and sanitation.

The authority having jurisdiction may require that sufficient evidence or proof be submitted to substantiate any claims regarding the use or suitability of utilization equipment, material, method, or design of wiring. The authority having jurisdiction may, but is not required to, record the approval of alternative materials and methods, and any relevant information, in the files of the authority having jurisdiction or on the approved construction documents or permit.

80.7 Modifications. The authority having jurisdiction may grant modifications for individual cases whenever there are practical difficulties involved in carrying out the provisions of this *Code.* Prior to granting any modifications, the authority having jurisdiction must first find that:

(1) the strict application of this *Code* is impractical under the circumstances;

(2) the modification is in conformity with the intent and purpose of this *Code*;

(3) the modification does not lessen any fire protection requirements;

(4) the modification does not lessen any degree of structural integrity.

The authority having jurisdiction may, but is not required to, record the approval of modifications and any relevant information in the files of the authority having jurisdiction or on the approved permit plans.

80.8 Tests. Whenever there is insufficient evidence of compliance with the provisions of this *Code* or evidence that any material or method of construction does not conform to the requirements of this *Code*, the authority having jurisdiction may require tests to establish compliance. The permit applicant is responsible for paying the costs of the testing.

Test methods shall be as specified in this *Code* or by other recognized test standards. If there are no recognized and accepted test methods for the proposed alternate, the authority having jurisdiction shall determine the test procedures.

All tests shall be made by an *approved* agency. Reports of such tests shall be retained by the authority having jurisdiction until the permit receives final approval.

II. Organization and Enforcement

80.10 Authority.

(A) Jurisdiction of Department of Construction and Inspections. The Department of Construction and Inspections is authorized to administer, interpret, and enforce this *Code* and is referred to throughout this *Code* as the "authority

having jurisdiction." The Department of Construction and Inspections is under the administrative and operational control of the Director.

Whenever the term or title "Electrical Code Official," "Administrative Authority," "Responsible Official," "Chief Inspector," or "Code Enforcement Officer" is used in this *Code*, it means the authority having jurisdiction (AHJ).

(B) Designees. The authority having jurisdiction is authorized to appoint such officers, inspectors, assistants and other employees as needed. The authority having jurisdiction may authorize such employees as may be necessary to carry out the functions of the Department of Construction and Inspections.

(C) Right of Entry. With the consent of the owner or occupier of a building or premises, or pursuant to a lawfully issued warrant, the authority having jurisdiction may enter a building or premises at any reasonable time to perform the functions authorized by this *Code*.

(D) Authority to Disconnect Utilities in Emergencies. The authority having jurisdiction has the authority to disconnect or order discontinuance of any utility service or energy supply to buildings, structures, or equipment regulated by this *Code* in cases of emergency where necessary to eliminate an imminent hazard to life or property. The authority having jurisdiction may enter any building or premises to disconnect utility service or energy supply. The authority having jurisdiction shall, wherever possible, notify the serving utility, owner, and occupant of the building, structure, or premises of the decision to disconnect prior to taking such action, and shall notify the serving utility, owner, and occupant of the building, structure, or premises in writing of such disconnection immediately thereafter.

Utility service shall be discontinued until the equipment, appliances, devices, or wiring found to be defective or defectively installed are removed or restored to a safe condition.

It shall be unlawful for any person to reconnect any electrical equipment disconnected by the authority having jurisdiction or to connect to an alternative source of energy, fuel, or power supply until the equipment is placed in a safe condition and is approved by the authority having jurisdiction.

(E) Connection After Order to Disconnect. No person shall make connections from any energy, fuel or power supply nor supply energy or fuel to any equipment regulated by this *Code* that has been disconnected or ordered to be disconnected by the authority having jurisdiction, or the use of which has been ordered to be discontinued by the authority having jurisdiction until the authority having jurisdiction authorizes the reconnection and use of such equipment.

(F) Liability. Nothing contained in this *Code* is intended to be nor shall be construed to create or form the basis for any liability on the part of the City or its officers, employees, or agents, for any injury or damage resulting from the failure of a building to conform to the provisions of this *Code*, or by reason or as a consequence of any inspection, notice, order, certificate, permission, or approval authorized or issued or done in connection with the implementation or enforcement of this *Code*, or by reason of any action or inaction on the part of the City related in any manner to the enforcement of this *Code* by its officers, employees or agents.

This *Code* shall not be construed to relieve or lessen the responsibility of any person owning, operating, or controlling any building or structure for any damages to persons or property caused by defects, nor shall the Department of Construction and Inspections or the City of Seattle be held to have assumed any such liability by reason of the inspections authorized by this *Code* or any permits or certificates issued under this *Code*.

Neither the authority having jurisdiction nor any employee charged with the enforcement of this *Code* shall be personally liable for any damage that accrues to persons or property as a result of any act or omission committed in the discharge of their duties, provided that the authority having jurisdiction or employee acted in good faith and without malice.

(G) Code Interpretation or Explanation. Electrical inspectors may give information as to the meaning or application of the *National Electrical Code* and the Seattle Supplement, but shall not lay out work or act as consultants for contractors, owners, or users.

(H) Cooperation of Other Officials and Officers. The authority having jurisdiction may request, and shall receive as far as may be necessary in the discharge of duties, the assistance and cooperation of other officials of the City of Seattle and officers of public and private utilities.

80.11 Responsibility for Compliance. Responsibility for compliance with the requirements of this *Code* shall be the obligation of the owner of the building, structure, or premises, the duly authorized agent of the owner, or other person responsible for the condition or work, and not of the City or any of its officers or employees.

80.12 Unsafe Conditions.

(A) Unsafe Conditions or Code Violations. The authority having jurisdiction may inspect any new or existing electrical installation or equipment, and if the installation or equipment is found to be maintained or used in an unsafe condition or found to be in violation of this *Code*, the authority having jurisdiction is authorized to serve upon the owner, agent, or other person responsible for the condition a notice or order stating the required correction. Any person served such notice who fails to comply with the order therein shall be in violation of this ordinance and subject to the penalties provided in this *Code*.

(B) Emergency Orders. Whenever the authority having jurisdiction finds that any building or structure, or portion thereof, is in such a dangerous and unsafe condition as to constitute an imminent hazard to life or limb, the authority having jurisdiction may issue an emergency order. The emergency order may (1) direct that the building or structure, or portion thereof, be restored to a safe condition; (2) require that the building or structure, or portion thereof, be vacated by a date certain to be specified in the order; and (3) in the case of extreme danger may specify immediate vacation of the building or structure and authorize the disconnection of utilities or energy source pursuant to Section 80.10(D). No person shall occupy the building or structure, or portion thereof, after the date on which it is required to be vacated until it is restored to a safe condition as required by the order and this *Code*. It shall be unlawful for any person to fail to comply with an emergency order issued by the authority having jurisdiction.

(1) **Service of the Emergency Order.** The order shall be posted on the premises or personally served on the owner of the building or premises or any person responsible for the condition. The order shall specify a date certain for compliance. Service shall be in the manner set forth in Section 80.13 of this *Code.*

(2) **Effect of the Emergency Order.** No person may occupy a building, structure, or premises, or portion thereof, after the date on which the building is required to be vacated until the building, structure, or premises, or portion thereof, is restored to a safe condition as required by the order and this *Code*. It is a violation for any person to fail to comply with an emergency order issued by the authority having jurisdiction.

(C) Hazard correction order. Whenever the authority having jurisdiction finds that unsafe equipment exists, the authority having jurisdiction may issue a hazard correction order specifying the conditions causing the equipment to be unsafe and directing the owner or other person responsible for the unsafe equipment to correct the condition by a date certain. In lieu of correction, the owner may submit a report or analysis to the authority having jurisdiction analyzing the conditions and establishing that the equipment is, in fact safe. The authority having jurisdiction may require that the report or analysis be prepared by a licensed engineer.

(1) **Service of hazard correction order.** The order shall be served upon the owner, agent, or other responsible person by personal service or regular first-class mail addressed to the last known address of such person or if no address is available after reasonable inquiry, the order may be posted in a conspicuous place on the premises. The order may also be posted if served by personal service or first-class mail.

(2) **Effect of hazard correction order.** It is a violation for any person to fail to comply with a hazard correction order as specified in this subsection.

80.13 Enforcement, Violations, and Penalties.

(A) Violations. It shall be a violation of this *Code* for any person, firm, or corporation to:

(1) erect, construct, enlarge, repair, move, improve, remove, convert, or demolish, equip, occupy, or maintain any building or structure in the City, contrary to or in violation of any of the provisions of this *Code;*

(2) knowingly aid, abet, counsel, encourage, hire, commend, induce, or otherwise procure another to violate or fail to comply with any of the provisions of this *Code;*

(3) use any materials or to install any device, appliance, or equipment which does not comply with applicable standards of this *Code* or which has not been approved by the authority having jurisdiction;

(4) violate or fail to comply with any final order issued by the building official pursuant to the provisions of this *Code* or with any requirements of this *Code;*

(5) remove, mutilate, destroy, or conceal any notice or order issued or posted by the building official pursuant to the provisions of this *Code*, or any notice or order issued or posted by the building official in response to a natural disaster or other emergency; or

(6) conduct work under permit without requesting inspections required by this *Code*.

(B) Notice of Violation. If, after investigation, the authority having jurisdiction determines that standards or requirements of this *Code* have been violated or that orders or requirements have not been complied with, the authority having jurisdiction may serve a notice of violation upon the owner, agent, or other person responsible for the action or condition. The notice of violation shall state the standards or requirements violated, what corrective action, if any, is necessary to comply with the standards or requirements, and a date certain for compliance.

(1) Serving the Notice of Violation. The notice shall be served upon the owner, agent, or other responsible person by personal service or first-class mail addressed to the last known address of such person. If no address is available after reasonable inquiry, the notice may be posted at a conspicuous place on the property. The notice may also be posted even if served by personal service or first-class mail. The notice of violation shall be considered a final order of the authority having jurisdiction if no request for review before the authority having jurisdiction is made pursuant to Section 80.13(B)(2). Nothing in this section limits or precludes any action or proceeding to enforce this Article, and nothing obligates or requires the authority having jurisdiction to issue a notice of violation prior to the imposition of civil or criminal penalties.

(2) Review of Notice of Violation by the Authority Having Jurisdiction.

(a) Any person affected by a notice of violation issued pursuant to Section 80.13(B) may obtain a review of the notice by making a request in writing within 10 days after service of the notice. When the last day of the period computed is a Saturday, Sunday, or City holiday, the period runs until 5:00 p.m. of the next business day.

The review shall occur not less than 10 nor more than 20 days after the request is received by the authority having jurisdiction unless otherwise agreed by the person requesting the review.

Any person affected by the notice of violation may submit additional information to the authority having jurisdiction within ten days after the request for review is filed, unless the authority having jurisdiction and the person requesting the review agree to a different time period for documents to be submitted.

(b) The review shall be made by a representative of the authority having jurisdiction who will review any additional information that is submitted and the basis for issuance of the notice of violation. The reviewer may request clarification of the information received and a site visit.

After the review, the authority having jurisdiction shall:

1. Sustain the notice; or
2. Withdraw the notice; or
3. Amend the notice; or
4. Continue the review to a date certain.

(c) The authority having jurisdiction shall issue an order containing the decision within 15 days of the date that the review is completed and shall mail or cause the order to be mailed by regular first-class mail to the persons requesting the review and the persons named on the notice of violation, addressed to their last known addresses. This decision is the final order of the authority having jurisdiction.

(C) Stop Work Orders. Whenever any installation, alteration, repair, or removal of electrical work is being done contrary to the provisions of this *Code*, or in the event of dangerous or unsafe conditions related to electrical work, the authority having jurisdiction may issue a stop work order describing the violation or unsafe condition at the site. No electrical work may proceed until the described violation or condition is corrected and approved by the authority having jurisdiction.

(1) Service of Stop Work Order. The authority having jurisdiction may serve the stop work order by posting it in a conspicuous place at the site, if posting is physically possible. If posting is not physically possible the stop work order may be served by personal service or by first class mail to the last known address of the property

owner, the person doing or causing the work to be done, and the holder of a permit if work is being stopped on a permit. For the purpose of this section, service is complete at the time of posting or of personal service, or if mailed, 3 days after the date of mailing. When the last day of the period so computed is a Saturday, Sunday, or City holiday, the period runs until 5:00 p.m. on the next business day.

(2) Effective Date of Stop Work Order. Stop work orders are effective when posted, or if posting is not physically possible, when one of the persons identified in Section 80.11(B)(1) is served.

(3) Review by the Authority Having Jurisdiction for Stop Work Orders

(a) Any person aggrieved by a stop work order may obtain a review of the order by delivering to the authority having jurisdiction a request in writing within 2 business days of the date of service of the stop work order. The review shall occur within 2 business days after receipt by the authority having jurisdiction of the request for review unless the requestor agrees to a longer time. Any person aggrieved by or interested in the stop work order may submit additional information to the authority having jurisdiction for consideration as part of the review at any time prior to the review.

(b) The review will be made by a representative of the authority having jurisdiction who will review all additional information received and may also request a site visit. After the review, the authority having jurisdiction may:

(1) Sustain the stop work order;

(2) Withdraw the stop work order;

(3) Modify the stop work order; or

(4) Continue the review to a date certain for receipt of additional information.

(c) The authority having jurisdiction shall issue an order of the authority having jurisdiction containing the decision within 2 business days after the review and shall cause the order to be sent by first class mail to the person or persons requesting the review, any person on whom the stop work order was served, and any other person who requested a copy before issuance of the order, addressed to their last known address.

(D) Civil Actions and Penalties.

(1) Civil Penalties. Any person found violating or failing to comply with the provisions of this *Code* shall be subject to a cumulative civil penalty in an amount not to exceed $500 per day for each violation from the date the violation occurs or begins until compliance is achieved. In cases where the authority having jurisdiction has issued a notice of violation, the violation will be deemed to begin, for purposes of determining the number of days of violation, on the date compliance is required by the notice of violation.

(2) Enforcement in Municipal Court. Civil actions to enforce this chapter shall be brought exclusively in Seattle Municipal Court, except as otherwise required by law or court rule. In any civil action for a penalty, the City has the burden of proving by a preponderance of the evidence that a violation exists or existed; the issuance of a notice of violation or of an order following a review by the authority having jurisdiction is not itself evidence that a violation exists.

(3) Judicial Review. Because civil actions to enforce this *Code* must be brought exclusively in Seattle Municipal Court pursuant to Subsection 80.13(D)(2), orders of the authority having jurisdiction, including notices of violation issued under this chapter, are not subject to judicial review pursuant to chapter 36.70C RCW.

(4) Appeal to Superior Court. Final decisions of the Seattle Municipal Court on enforcement actions authorized by Title 22 and this *Code* may be appealed pursuant to the Rules for Appeal of Decisions of Courts of Limited Jurisdiction.

(E) Alternative Criminal Penalty. Anyone violating or failing to comply with any notice of violation or order issued by the authority having jurisdiction pursuant to this *Code* or who removes, mutilates, destroys, or conceals a notice issued or posted by the authority having jurisdiction shall, upon conviction thereof, be punished by a fine of not more than $5,000 or by imprisonment for not more than 365 days, or by both such fine and imprisonment for each separate violation. Each day's violation shall constitute a separate offense.

(F) Additional Relief. The authority having jurisdiction may seek legal or equitable relief to enjoin any acts or practices and abate any condition when necessary to achieve compliance.

80.14 Recording of Notices. The authority having jurisdiction may record a copy of any order or notice with the Department of Records and Elections of King County.

The authority having jurisdiction may record with the Department of Records and Elections of King County a notice that a permit has expired without a final inspection after reasonable efforts have been made to obtain a final inspection.

80.15 Rules of the Authority Having Jurisdiction.

(A) Authority. The authority having jurisdiction has authority to issue interpretations of this *Code* and to adopt and enforce rules and regulations supplemental to this *Code* as may be deemed necessary in order to clarify the application of the provisions of this *Code*. Such interpretations, rules, and regulations shall be in conformity with the intent and purpose of this *Code.*

(B) Procedure for Adoption of Rules. The authority having jurisdiction shall promulgate, adopt, and issue rules according to the procedures as specified in the *Administrative Code,* Chapter 3.02 of the *Seattle Municipal Code*.

80.16 Construction Codes Advisory Board. An Electrical Code Committee of the Construction Codes Advisory Board, as established in Section 105 of the *Seattle Building Code*, may examine proposed new editions of and amendments to this *Code* and any proposed administrative rules promulgated to enforce this *Code*. The Electrical Code Committee may make recommendations to the authority having jurisdiction and to the City Council relating to this *Code* and administrative rules. The committee may be called on an as-needed basis for the Construction Codes Advisory Board.

80.17 Administrative Review. Prior to issuance of the electrical permit, applicants may request administrative review by the authority having jurisdiction of decisions or actions pertaining to the application and interpretation of this *Code* by the Construction Codes Advisory Board according to International Building Code Section 103.11, except for emergency orders, hazard correction orders, stop work orders, notices of violations, and revocations of permits. The Chair shall consider the subject of the review and members' expertise when selecting members to conduct a review. The decision of the review is advisory only; the final decision is made by the authority having jurisdiction.

III. Permits and Inspections

80.50 Permit Application.

(A) Permit Required. It shall be unlawful to install, alter, repair, replace, modify, extend, or connect any electrical equipment, or allow the same to be done, without first obtaining a permit for the work from the authority having jurisdiction, except as allowed in subsections (B) and (C) of this Section. A separate electrical permit is required for each separate building or structure.

Informational Note: See the "Smoke and Fire Protection Features" section in the *Seattle Building Code* for required protection methods when electrical work penetrates fire-resistance rated building elements.

(B) Like-in-Kind Replacement. An electrical permit shall not be required for the like-in-kind replacement of the following electrical equipment:

(1) no more than 5 single-family residential luminaires, snap switches, dimmers, receptacles, lamps, or luminaire ballasts with an identical ballast;

(2) a single set of fuses, a single battery smaller than 150 amp hour, or single lead acid batteries;

(3) circuit breakers, contactors, relays, timers, starters, circuit boards, thermostats, or similar control components. For the purpose of this section, "circuit breaker" means a circuit breaker that is used to provide overcurrent protection only for a branch circuit, as defined in NEC 100;

(4) household appliance, gas or oil furnace, water heater, baseboard heater, and wall heating unit when the equipment is reconnected to a circuit that was lawfully installed and approved, and no alteration of the circuit is necessary;

(5) component(s) of electrical signs, outline lighting, or skeleton neon tubing when replaced on-site by an appropriately licensed electrical contractor and when the sign, outline lighting or skeleton neon tubing system is not modified;

(6) one 10-horsepower or smaller motor;

(7) electrical equipment repaired or installed in connection with an elevator, dumbwaiter, or similar conveyance when the equipment work is covered under an issued elevator permit; and

(8) lead acid batteries supporting a listed UPS system when replaced by a factory authorized technician.

(C) Work Exempt from Permitting Requirements. An electrical permit shall not be required for the following electrical equipment:

(1) induction detection loops used to control gate access devices;

(2) induction detection loop or similar circuits for traffic management systems will be accepted by the authority having jurisdiction without inspection;

(3) embedded premanufactured heat mats placed in tile grout where the mat is listed by an approved testing laboratory and comes from the manufacturer with preconnected lead-in conductors. All listing marks and lead-in conductor labels must be left intact and visible for evaluation and inspection by the installing electrician and the electrical inspector; and

(4) wiring for communication systems and installation of optical fiber cables, as set forth in *NEC* Chapter 8 and Article 770, as follows:

(a) in one- and two-family dwellings, or

(b) in installations of 1,000 feet or less.

Exemption from the permit requirements of this *Code* shall not be deemed to grant authorization for work done in any manner that violates the provisions of this *Code* or any other laws or ordinances of the City. All work shall comply with this *Code*, even where no permit is required.

(D) Flood Hazard Areas. In addition to the permit required by this section, all work to be performed in areas of special flood hazard, as identified in the report entitled "Flood Insurance Study for King County, Washington and Incorporated Areas" and the accompanying Flood Insurance Rate Maps filed in C.F. 296948, is subject to additional standards and requirements, including floodplain development approval or a Floodplain Development License as set forth in Chapter 25.06, the Seattle Floodplain Development Ordinance, and Chapter 16 of the *Seattle Building Code*.

80.51 Application for Permit.

(A) Application. To obtain a permit, the applicant shall first file an application in a format determined by the authority having jurisdiction. Every application shall:

(1) Identify and describe the work to be covered by the permit for which application is made;

(2) Describe the land on which the proposed work is to be done by legal description, property address, or similar description that will readily identify and definitively locate the proposed building or work;

(3) Provide the ((~~contractor's~~)) business name, address, phone number for the project contact and contractor ((~~,~~)) and the contractor's current contractor registration number with state license number of the licensed contractor, if a contractor has been selected;

(4) Be accompanied by construction documents, including plans, drawings, diagrams, computations and specifications, equipment schedules, and other data as required in Sections 80.54(B) and (C) when required by the authority having jurisdiction;

(5) State the valuation of the electrical work to be done. The valuation of the electrical work is the estimated current value of all labor and material, whether paid for or not, for which the permit is sought;

(6) Be ((~~signed~~)) electronically submitted by the owner of the property or building, or the owner's authorized agent, who may be required to submit evidence to indicate such authority;

(7) Give such other data and information as may be required by the authority having jurisdiction;

(8) State the name of the owner and the name, address, and phone number of a contact person;

(9) Substantially conform with applicable law in effect on the date described in Section R101.3, as modified by any exception; and

(10) Include documentation of compliance with the *Seattle Energy Code*. The authority having jurisdiction may refuse to issue or may revoke a permit if any statement in the permit application is found to be untrue.

(B) Construction Documents.

(1) General. In addition to the requirements of Section 80.51(A), construction documents, including plans and specifications, shall be submitted with each electrical permit application and in an electronic format approved by the authority having jurisdiction.

Construction documents shall be submitted for work that includes the following:

(a) permanent services or feeders of 400 amperes or over; temporary services of 600 amperes or over.

(b) switches ((~~,~~)) and circuit breakers, 400 amperes and larger installed in ((~~and~~)) equipment rated 400 amperes or over;

(c) any equipment operating at voltages exceeding 600;

(d) services, feeders, and power supplies for emergency, legally required standby or fire pump systems;

(e) proposed alteration or installation, the scope of which covers more than 5,000 square feet;

(f) proposed alteration or installation which cannot be adequately described on the application form;

(g) new or altered electrical installations in educational, institutional, and health or personal care occupancies as required in 296-46B-900(1); (3)(a), (b), (c), (e), & (g); and WAC 269-46B-900 Tables 900-1 and 900-2; and

Exception to (a) through (g): Plan review applications will not be accepted for installations in one- and two-family dwelling structures that can be adequately described on the over-the-counter application form.

(h) photovoltaic and other renewable energy systems. Submittals for these systems shall be as follows:

(1) systems rated over 26 kW shall submit plans and specifications, including system layout and all system components at the time of application;

(2) systems rated over ((~~7.7 kW~~)) 12 kW shall submit plans and specifications, including system layout and all system components at the time of application; and

(3) systems rated ((~~7.7 kW~~)) 12 kW and under shall provide a one line drawing and manufacturer's installation requirements to the field inspector prior to the first cover inspection

(i) installation of new equipment or systems on a development site with three or more dwelling units or multiple buildings that are not regulated elsewhere in this section.

(2) Fire Department Review. Electronic plans and specifications for fire alarm systems shall be submitted to SDCI. SDCI shall provide electronic plans to the Seattle Fire Department for review. See *Seattle Fire Code* Section 907 for required submittal information.

(3) Clarity of Plans. Plans shall be drawn to a clearly indicated and commonly accepted scale. The plans shall be of sufficient quality to be easily read.

Plans shall indicate the nature and extent of the work proposed and shall show in detail that it will conform to the provisions of this *Code.* All new and revised electrical work shall be readily distinguishable from other electrical work. Applicants shall not use a red color to create notes, text, annotations, and "redlines" within electronic plans. The use of a red color on submitted electronic plan sets will be reserved for the exclusive use of SDCI plans examiners. If plans are incomplete, unintelligible, indefinite, or poorly organized, the authority having jurisdiction may require that the plans be prepared by a licensed electrical engineer, or may reject or

refuse to examine such plans, even though a plan examination fee has been paid in accordance with *Seattle Municipal Code*, Title 22, Subtitle IX, Permit Fees.

(4) Information Required on Plans. Information on plans and specifications shall include the following:

(a) the type of occupancy and a complete scope of work;

(b) a complete riser and a one line diagram to include:

(1) approved service point location, service connection, metering, and grounding,

(2) feeder connections and if utilized, their equipment grounding conductors,

(3) grounding of separately derived systems,

(4) grounding electrode system and conductor size for service, transformers, and generators including main and system bonding jumpers,

(5) equipment specifications and designations, including voltage, ampacity, disconnecting means and short-circuit current rating,

(6) ground-fault equipment protection, when required,

(7) transformer over-current protective device size(s), and

(8) transformer primary and secondary voltage, and kilovolt-amperes (KVA) rating.

(c) clear identification of all circuitry, including but not limited to: circuit numbers, wire sizes, insulation types, conduit sizes and types;

(d) elevators used as an accessible means of egress element and clearly identified as such;

(e) a complete set of switchboard and panel schedules. These shall include all load calculations and demand factors used for computation per Article 220;

(f) a complete project load summary to include existing loads as computed in accordance with *NEC* Article 220, and all added loads. Electrical calculations and lighting summaries may be submitted on separate computation sheets;

(g) fault current calculations and the listed interrupting rating of all feeder and service equipment;

(h) a key to all symbols used;

(i) a luminaire schedule showing all pertinent information and include the *Seattle Energy Code* lighting power allowance form; and

(j) any other information as may be required by the plans examiner.

(C) Incomplete Submittals. Plans shall be submitted in a manner that is organized to facilitate plan review. Plan sets not having the information and specifications required by 80.51(B) or not clearly organized are deemed to be incomplete submittals. Review time will be charged at the hourly rate established by the Seattle Fee Subtitle until a complete submittal is received.

80.52 Application Review and Permit Issuance.

(A) Issuance. The application and construction documents shall be reviewed by the authority having jurisdiction. The construction documents may be reviewed by other departments of the City to ascertain compliance with the laws and ordinances under their jurisdiction.

(1) Issuance of Permit. A permit shall be issued to the applicant who becomes the permit holder if the authority having jurisdiction finds the following:

1. The work as described in an application for permit and the construction documents conform to the requirements of this *Code* and other applicable laws and ordinances; and

2. The fees specified in *Seattle Municipal Code*, Title 22, Subtitle IX, Permit Fees, have been paid.

Exception No. 1: The authority having jurisdiction may issue a permit for the installation of part of the electrical system of a building or structure before complete plans for the whole building or structure have been submitted or approved, provided adequate information and detailed statements have been filed complying with all pertinent requirements of this Code. Holders of such permits may proceed at their own risk without assurance that the permit for the entire building or structure will be granted.

Exception No. 2: A permit may be issued for work to commence prior to the approval of plans, if such approval is delayed beyond 10 working days after the plans have been submitted for examination. The holders of such permits may proceed at their own risk, with the understanding that any work undertaken prior to approval of plans shall be done in accordance with the provisions of this Code and in accordance with the plans as subsequently approved.

Informational Note: Exception No. 2 refers to what is commonly called, by the Department of Construction and Inspections, a "Get Started Permit."

(2) Compliance with Approved Construction Documents. When issuing a permit, the authority having jurisdiction shall endorse the permit in writing and endorse in writing or stamp the plans "APPROVED." Approved plans and permits shall not be changed, modified, or altered without authorization from the authority having jurisdiction, and all work shall be done in accordance with the approved plans, except as the authority having jurisdiction may require during field inspection to correct errors or omissions.

(3) Revisions to the Permit. When changes to the approved work are proposed during construction, approval of the authority having jurisdiction shall be obtained prior to making the changes. The authority having jurisdiction may approve minor changes to the plans for work that does not reduce the fire and life safety of the structure. The authority having jurisdiction shall determine if it is necessary to revise the approved construction documents to describe the changes.

If revised plans are required, changes shall be submitted to and approved by the authority having jurisdiction, accompanied by fees specified in the *Seattle Municipal Code*, Title 22, Subtitle IX, Permit Fees prior to occupancy. All substitutions and changes shall conform to the requirements of this *Code* and other pertinent laws and ordinances.

(4) Requirement for License. No electrical permit shall be issued to an applicant who is engaging in, conducting, or carrying on the business of installing wires or equipment to convey electric current or of installing apparatus to be operated by electric current unless the applicant possesses a valid State of Washington license as required by RCW 19.28. The licensed installer responsible for the work shall be identified on the electrical permit.

Exception: Persons not possessing a license may obtain an electrical permit in order to do electrical work at a residence, farm, place of business, or other property that they own as described in RCW 19.28.261.

(5) Cancellation of Permit Application. Applications may be cancelled if no permit is issued by the earlier of the following:

(1) Twelve months following the date of application; or

(2) Sixty days from the date of written notice that the permit is ready to issue.

The authority having jurisdiction shall notify the applicant in writing at least 30 days before the application is cancelled. The notice shall specify a date by which a request for extension must be submitted in order to avoid cancellation. The date shall be at least two weeks prior to the date on which the application will be cancelled.

Exception: Notwithstanding other provisions of this Code, applications may be extended where issuance of the permit is delayed by litigation, preparation of environmental impact statements, appeals, strikes, or other causes related to the application that are beyond the applicant's control.

(6) Extensions Prior to Permit Issuance. At the discretion of the authority having jurisdiction, applications for projects that require more than 12 months to review and approve may be extended for a period that provides reasonable time to complete the review and approval, but in no case longer than 24 months from the date of the original application. No application may be extended more than once. After the application is cancelled, the applicant shall submit a new application and pay a new fee to restart the permit process.

Exception: Notwithstanding other provisions of this Code, applications may be extended where issuance of the permit is delayed by litigation, preparation of environmental impact statements, appeals, strikes, or other causes related to the application that are beyond the applicant's control, or while the applicant is making progress toward issuance of a master use permit.

(B) Retention of Plans and Permits. The electronically approved construction documents shall be retained by the authority having jurisdiction. The permit holder shall make a printed copy of the approved construction drawings available on the job site for use by inspectors while work is authorized to occur. Drawings provided for the use of inspectors on the job site shall have minimum dimensions of 11" x 17" for photovoltaic installations and 24" x 30" for all other installations.

(C) Validity. The issuance of a permit or approval of construction documents shall:

(1) not be construed to be a permit for, or an approval of, any violation of any of the provisions of this *Code* or other pertinent laws or ordinances;

(2) not prevent the authority having jurisdiction from later requiring the correction of errors in the plans or from preventing building operations being carried on thereunder when in violation of this *Code* or of other pertinent laws and ordinances of the City;

(3) not prevent the authority having jurisdiction from requiring correction of conditions found to be in violation of this *Code* or any other ordinance of the City; and

(4) not be construed to extend or otherwise affect any period of time for compliance specified in any notice or order issued by the authority having jurisdiction or other administrative authority requiring the correction of any such conditions.

(D) Expiration and Renewal of Issued Permits.

(1) Expiration of Permits. Authority to do the work authorized by a permit expires 12 months from the date of issuance.

Exception No. 1: Initial permits for major construction projects that require more than 1 year to complete, according to a construction schedule submitted by the applicant, may be issued for a period that provides reasonable time to complete the work but in no case longer than 3 years.

Exception No. 2: Permits that expire in less than 1 year may be issued where the authority having jurisdiction determines a shorter period is appropriate based on the scope of work or otherwise limited by this Code.

Informational Note: See Article 590 Temporary Installations.

(2) Renewal. Permits may be renewed and renewed permits may be further renewed by the authority having jurisdiction provided the following conditions are met:

(1) Application for renewal shall be made within the 30-day period immediately preceding the date of expiration of the permit;

(2) The work authorized by the permit has been started and is progressing at a rate approved by the authority having jurisdiction;

(3) If an application for renewal is made either more than one year after the effective date of a new or revised edition of the Electrical Code, the permit shall not be renewed unless:

(1) The authority having jurisdiction determines that the permit complies, or is modified to comply, with the Electrical code or codes in effect on the date of application renewal;

(2) The work authorized by the permit is substantially underway and progressing at a rate approved by the authority having jurisdiction. “Substantially underway” means that normally required inspections have been approved or work is being completed and inspected on a continuing basis; or

(3) Commencement or completion of the work authorized by the permit is delayed by litigation, appeals, strikes, or other extraordinary circumstances related to the work authorized by the permit, beyond the permit holder’s control; and

(4) If the project has had an associated discretionary Land Use review, and the land use approval has not expired.

(3) Re-establishment of Expired Permits. A new permit shall be required to complete work where a permit expired and work remains to be completed.

Exception: A permit which has been expired for less than one year may be reestablished upon approval of the authority having jurisdiction provided it complies with Items (1) and (2) of Section 80.52(D)(2) above.

(E) Revocation of Electrical Permits. Whenever the authority having jurisdiction determines there are grounds for revoking a permit issued under the provisions of this *Code*, the authority having jurisdiction may issue a notice of revocation.

(1) Standards for Revocation. A permit may be revoked if:

(a) This *Code* or the permit has been or is being violated and issuance of a notice of violation or stop work order has been or would be ineffective to secure compliance because of circumstances related to the violation;

(b) The permit was obtained with false or misleading information; or

(c) The permit was issued in violation of any ordinance or regulation or provision of this *Code*.

(d) The permit was issued in error.

(2) Notice of Revocation. Whenever the authority having jurisdiction determines there are grounds for revoking a permit, a notice of revocation may be issued. The notice of revocation shall identify the reason for the proposed revocation, including the violations, the conditions violated, and any alleged false or misleading information provided.

(a) *Serving Notice of Revocation.* The notice of revocation shall be served upon the owner of the property, the owner's authorized agent, or the person designated by the owner or agent to do the work authorized by a permit. The notice of revocation shall be served by personal service or first-class mail addressed to the last known address of such person, or if no address is available after reasonable inquiry, the notice may be posted in a conspicuous place on the premises. The notice may also be posted if served by personal service or first-class mail.

For purposes of this Section, service is complete at the time of personal service, or if mailed, 3 days after the date of mailing. When the last day of the period so computed is a Saturday, Sunday, or City holiday, the period runs until 5 p.m. on the next business day.

(b) *Effective Date of Revocation.* The authority having jurisdiction shall identify in the notice of revocation a date certain on which the revocation will take effect unless review before the authority having jurisdiction is requested and pursued pursuant to Section 80.52(E)(3).

(3) Review by the Authority Having Jurisdiction for Notice of Revocation.

(a) *Requesting a Review.* Any person aggrieved by a notice of revocation may obtain a review by making a request in writing to the authority having jurisdiction within 3 business days of the date of service of the notice of revocation.

The review shall occur within 5 business days after receipt by the authority having jurisdiction of the request for review.

(b) *Information Reviewed.* Any person affected by the notice of revocation may submit additional information to the authority having jurisdiction for consideration as part of the review at any time prior to the review. The review will be made by a representative of the authority having jurisdiction who will review all additional information received and may also request a site visit.

(c) *After the Review.* After the review, the authority having jurisdiction may:

(1) sustain the notice of revocation and set or modify the date the revocation will take effect; or

(2) withdraw the notice of revocation; or

(3) modify the notice of revocation and set or modify the date the revocation will take effect; or

(4) continue the review to a date certain.

(d) *Decision of the Authority Having Jurisdiction.* The authority having jurisdiction shall issue an order containing the decision within 10 days after the review and shall cause the same to be sent by first class

mail to the person or persons requesting the review, any other person on whom the notice of revocation was served, and any other person who requested a copy before issuance of the order. The order of the authority having jurisdiction is the final order of the City, and the City and all parties shall be bound by the order.

(F) Permit for Temporary Installations. The authority having jurisdiction may issue a nonrenewable permit for temporary electrical installations for use during the construction of buildings or for events such as carnivals, conventions, festivals, fairs, the holding of religious services, and temporary street lighting if life or property will not be jeopardized.

Permission to use a temporary installation shall be granted for no longer than 12 months, except that a permit for a temporary installation to be used for the construction of a building may be issued for the necessary period of construction. When temporary lighting is over the street area or public rights-of-way, proper authority for use of the rights-of-way shall first be obtained from the Seattle Department of Transportation. All temporary installations shall comply with all other requirements of this *Code.*

80.54 Inspections.

(A) General. All construction or work for which a permit is required is subject to inspection by the authority having jurisdiction. In addition to the inspections specified in Article 80, the authority having jurisdiction may make or require any other inspections of any electrical work to ascertain compliance with the provisions of this *Code* and other laws and ordinances that are enforced by the authority having jurisdiction.

(B) Connection of Electric Installations. It shall be unlawful to connect or to allow the connection of any electrical installations, extensions thereof, or electrical equipment to the electric current until the work is inspected and approved by the authority having jurisdiction.

(C) Inspection Requests. The owner of the property, the owner's authorized agent, or the person designated by the owner or agent to do the work authorized by a permit shall notify the authority having jurisdiction that work is ready for inspection as specified in this section and *Seattle Municipal Code,* Title 22, Subtitle IX, Permit Fees. Where a permit has been issued to a licensed contractor, it shall be the duty of the contractor to notify the authority having jurisdiction that work requiring inspection is ready for inspection.

The permit holder and the person requesting any inspections required by this *Code* shall provide access to and means for proper inspection of the work. It shall be the duty of the permit holder to cause the work to be accessible and exposed for inspection purposes until the work receives final approval by the authority having jurisdiction. Neither the authority having jurisdiction nor the City shall be liable for any expense incurred in the required removal or replacement of any material to allow inspection.

(D) Inspection Record. Work requiring an electrical permit shall not be commenced until the permit holder or the permit holder's agent has posted an inspection record in a conspicuous place on the premises and in a position which allows the authority having jurisdiction to conveniently make the required entries thereon regarding inspection of the work. This record shall be maintained in such position by the permit holder or the permit holder's agent until final approval has been granted by the authority having jurisdiction and the serving utility has made the connection to the electric current.

(E) Approvals Required. No work shall be done on any part of the building or structure beyond the point indicated in each successive inspection without first obtaining the approval of the authority having jurisdiction. Approval shall be given only after an inspection has been made of each successive step in the construction as indicated by each of the inspections required in Section 80.54(F) below.

Approval as a result of an inspection is not an approval of any violation of the provisions of this *Code* or of other pertinent laws and ordinances of the City. Inspections presuming to give authority to violate or cancel the provisions of this *Code* or of other pertinent laws and ordinances of the City are not valid.

(F) Required Inspections.

(1) Cover Inspection. The authority having jurisdiction is authorized to conduct cover inspections when the following work has been completed:

(a) All piping, ducts, plumbing, and like installations of other trades which are liable to interfere or run in close proximity to the electrical installation are permanently in place and inspected, but prior to any work to cover or conceal any installation of electrical equipment;

(b) Electrical equipment grounding (boxes, equipment, conductors, and provisions for grounding receptacles, etc.) for all systems shall be completely made-up; and

(c) For conduit systems, after all conduit has been installed and properly secured to the structure.

(2) Final Inspection. The authority having jurisdiction is authorized to conduct a final inspection after all wiring has been completed and all permanent fixtures such as switches, outlet receptacles, plates, electric hot-water tanks, lighting fixtures and all other equipment have been properly installed. The permit holder shall call for a final inspection when the work described on the permit has been completed. Failure to obtain a final inspection is a violation of Section 80.13 of this *Code*.

(G) Other Inspections. In addition to the required inspections specified in Section 80.54(E), the authority having jurisdiction is authorized to conduct or require any other inspections of any construction work to ascertain compliance with the provisions of this *Code* and other laws enforced by the authority having jurisdiction.

Where work, for which any permit or approval is required, is commenced or performed prior to making formal application and receiving the authority having jurisdiction's permission to proceed, the authority having jurisdiction may make a special investigation inspection before a permit may be issued for the work. Where a special investigation is made, a special investigation fee may be assessed in accordance with *Seattle Municipal Code*, Title 22, Subtitle IX, Permit Fees.

If work that requires a permit or approval is commenced or performed prior to making formal application and receiving the authority having jurisdiction's permission to proceed, the authority having jurisdiction may make a special investigation inspection before a permit is issued for the work. If a special investigation is made, a special investigation fee may be assessed in accordance with *Seattle Municipal Code*, Title 22, Subtitle IX, Permit Fees.

(H) Reinspections. The authority having jurisdiction may reinspect when work is not complete, corrections are not made, approved plans are not readily available to the inspector, access on the date for which inspection is requested is not provided, or work has deviated from approved construction documents.

For the purpose of determining compliance with Section ((~~80.4(C)~~)) 80.4(D), Maintenance, the authority having jurisdiction or the fire chief may cause any structure to be reinspected.

The authority having jurisdiction may assess a reinspection fee as set forth in *Seattle Municipal Code*, Title 22, Subtitle IX, Permit Fees for any action listed above for which reinspection may be required.

In instances where reinspection fees have been assessed, no additional inspection of the work shall be performed until the required fees have been paid.

80.55 Fees. A fee for each electrical permit and for other activities related to the enforcement of this *Code* shall be paid as set forth in the *Seattle Municipal Code*, Title 22, Subtitle IX, Permit Fees.

NEC 70

National Electrical Code

2020 Edition

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REVISION SYMBOLS IDENTIFYING CHANGES FROM THE PREVIOUS EDITION: Text revisions are shaded. A Δ before a section number indicates that words within that section were deleted and a Δ to the left of a table or figure number indicates a revision to an existing table or figure. When a chapter was heavily revised, the entire chapter is marked throughout with the Δ symbol. Where one or more sections were deleted, a • is placed between the remaining sections. Chapters, annexes, sections, figures, and tables that are new are indicated with an ***N***.

ARTICLE 90
Introduction

((~~90.1 Purpose.~~

~~**(A) Practical Safeguarding.** The purpose of this *Code* is the practical safeguarding of persons and property from hazards arising from the use of electricity. This *Code* is not intended as a design specification or an instruction manual for untrained persons.~~

~~**(B) Adequacy.** This *Code* contains provisions that are considered necessary for safety. Compliance therewith and proper maintenance result in an installation that is essentially free from hazard but not necessarily efficient, convenient, or adequate for good service or future expansion of electrical use.~~

~~Informational Note: Hazards often occur because of overloading of wiring systems by methods or usage not in conformity with this *Code*. This occurs because initial wiring did not provide for increases in the use of electricity. An initial adequate installation and reasonable provisions for system changes provide for future increases in the use of electricity.~~

~~**(C) Relation to Other International Standards.** The requirements in this *Code* address the fundamental principles of protection for safety contained in Section 131 of International Electrotechnical Commission Standard 60364-1, *Electrical Installations of Buildings*.~~

~~Informational Note: IEC 60364-1, Section 131, contains fundamental principles of protection for safety that encompass protection against electric shock, protection against thermal effects, protection against overcurrent, protection against fault currents, and protection against overvoltage. All of these potential hazards are addressed by the requirements in this *Code*.~~

90.2 Scope.

~~A **(A) Covered.** This Code covers the installation and removal of electrical conductors, equipment, and raceways; signaling and communications conductors, equipment, and raceways; and optical fiber cables for the following:~~

~~(1) Public and private premises, including buildings, structures, mobile homes, recreational vehicles, and floating buildings~~

~~(2) Yards, lots, parking lots, carnivals, and industrial substations~~

~~(3) Installations of conductors and equipment that connect to the supply of electricity~~

~~(4) Installations used by the electric utility, such as office buildings, warehouses, garages, machine shops, and recreational buildings, that are not an integral part of a generating plant, substation, or control center~~

~~(5) Installations supplying shore power to ships and watercraft in marinas and boatyards, including monitoring of leakage current~~

~~(6) Installations used to export electric power from vehicles to premises wiring or for bidirectional current flow~~

~~**(B) Not Covered.** This Code does not cover the following:~~

~~(1) Installations in ships, watercraft other than floating buildings, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles~~

~~Informational Note: Although the scope of this Code indicates that the Code does not cover installations in ships, portions of this Code are incorporated by reference into Title 46, Code of Federal Regulations, Parts 110–113.~~

~~(2) Installations underground in mines and self-propelled mobile surface mining machinery and its attendant electrical trailing cable~~

~~(3) Installations of railways for generation, transformation, transmission, energy storage, or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communications purposes~~

~~(4) Installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations~~

~~(5) Installations under the exclusive control of an electric utility where such installations~~

~~a. Consist of service drops or service laterals, and associated metering, or~~

~~b. Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, energy storage, or distribution of electric energy, or~~

~~c. Are located in legally established easements or rights-of-way, or~~

~~d. Are located by other written agreements either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations. These written agreements shall be limited to installations for the purpose of communications, metering, generation, control, transformation, transmission, energy storage, or distribution of electric energy where legally established easements or rights-of-way cannot be obtained. These installations shall be limited to federal lands, Native American reservations through the U.S. Department of the Interior Bureau of Indian Affairs, military bases, lands controlled by port authorities and state agencies and departments, and lands owned by railroads.~~

~~Informational Note to (4) and (5): Examples of utilities may include those entities that are typically designated or recognized by governmental law or regulation by public service/utility commissions and that install, operate, and maintain electric supply (such as generation, transmission, or distribution systems) or communications systems (such as telephone, CATV, Internet, satellite, or data services). Utilities may be subject to compliance with codes and standards covering their regulated activities as adopted under governmental law or regulation. Additional information can be found through consultation with the appropriate governmental bodies, such as state regulatory commissions, the Federal Energy Regulatory Commission, and the Federal Communications Commission.~~

~~**(C) Special Permission.** The authority having jurisdiction for enforcing this *Code* may grant exception for the installation of conductors and equipment that are not under the exclusive control of the electric utilities and are used to connect the electric utility supply system to the service conductors of the premises served, provided such installations are outside a building or structure, or terminate inside at a readily accessible location nearest the point of entrance of the service conductors.~~))

ARTICLE 100
Definitions

Authority Having Jurisdiction (AHJ). ((~~An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure. (CMP-1)~~)) The Department of Construction and Inspections is authorized to administer and enforce this *Code* and shall be known throughout this Code as the *authority having jurisdiction.* The Department of Construction and Inspections is under the administrative and operational control of the Director.

((~~Informational Note: The phrase "authority having jurisdiction, "or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.~~))

Development Site. A development site or premises is a piece of land within the boundaries of which, all the development standards for the land use, building, and electrical codes are applied to the wiring on a premises.

Qualified Person. One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved. (CMP-1)

Informational Note: RCW 19.28.161 describes training and certification and RCW 19.28.261 describes when the person working with electrical equipment and installations may be exempt from the training and certification. ((~~Refer~~)) Also refer to NFPA 70E-2018, Standard for Electrical Safety in the Workplace, for electrical safety training requirements.

Service Point. The point of connection between the facilities of the serving utility and the premises wiring. For service point connection requirements, see Section 230.12. (CMP-10)

Informational Note: The service point can be described as the point of demarcation between where the serving utility ends and the premises wiring begins. The serving utility generally specifies the location of the service point based on the conditions of service.

Service Terminal Box. An approved box to be used exclusively for the connection of the utility distribution system to the consumer's service entrance conductors.

Traffic Management System. A traffic management system provides signalization for controlling vehicular traffic, pedestrian traffic, or rolling stock and may be comprised of the following components:

(1) Traffic illumination systems;

(2) Traffic signal systems;

(3) Traffic monitoring systems;

(4) The electrical service cabinet and all related components and equipment installed on the load side of the service cabinet supplying electrical power to the traffic management system; and

(5) Signalization system(s) necessary for the operation of a light rail system.

Unobstructed Egress. Unobstructed egress (as applied to NEC 110.26 (C)(2)(a)) means an egress path that allows a worker to travel to the exit from any other area in the room containing the equipment described in NEC 110.26 (C)(2) without having to pass through that equipment's required working space.

Informational Note: The definition for "egress" found in WAC 296-46B-100 is incorporated herein with edits.

ARTICLE 110
Requirements for Electrical Installations

110.2 Approval. The conductors and equipment required or permitted by this *Code* shall be ((~~acceptable~~)) approved only if ((~~approved~~)) the conductors or equipment meet minimum safety standards by conforming to applicable electrical product standards recognized by the authority having jurisdiction. Suitability of compliance may be demonstrated by listing or labeling from a National Recognized Testing Laboratory (NRTL).

Informational Note: See Sections 80.5, Testing, 90.7, Examination of Equipment for Safety, and 110.3, Examination, Identification, Installation, and Use of Equipment. ((~~See~~)) Also see Article 100 definitions of *Approved, Identified, Labeled,* and *Listed.*

110.11 Deteriorating Agents. Unless identified for use in the operating environment, no conductors or equipment shall be located in damp or wet locations; where exposed to gases, fumes, vapors, liquids, or other agents that have a deteriorating effect on the conductors or equipment; or where exposed to excessive temperatures.

Informational Note No. 1: See 300.6 for protection against corrosion.

Informational Note No. 2: Some cleaning and lubricating compounds can cause severe deterioration of many plastic materials used for insulating and structural applications in equipment.

Equipment not identified for outdoor use and equipment identified only for indoor use, such as "dry locations," "indoor use only," "damp locations," or enclosure Types 1, 2, 5, 12, 12K, and/or 13, shall be protected against damage from the weather during construction.

Informational Note No. 3: See Table 110.28 for appropriate enclosure-type designations.

Informational Note No. 4: Minimum flood provisions are provided in NFPA 5000-2015 *Building Construction and Safety Code*, the *International Building Code (IBC)*, and the *International Residential Code for One- and Two-Family Dwellings (IRC)*.

(A) Exposure not identified for use in the operating environment. Electrical equipment and wiring submerged or exposed to water must comply with the following:

(1) All circuit breakers, fuses, controllers, receptacles, lighting switches or dimmers, electric heaters, and any sealed device or equipment (e.g., relays, contactors, etc.) must be replaced.

(2) All other electrical equipment (e.g., wiring, breaker panelboards, disconnect switches, switchgear, motor control centers, boiler controls, HVAC/R equipment, electric motors, transformers, appliances, water heaters, and similar appliances) must be replaced or reconditioned by the original manufacturer or by its approved representative. See Sections 210.15, 240.62, 240.88, 240.102 and 410.7 for equipment that is not permitted to be reconditioned. See also 110.21(A)(1).

Informational Note: WAC 296-46B-110(011), requirements for electrical equipment and wiring submerged or exposed to water, is incorporated herein.

110.12 Mechanical Execution of Work. Electrical equipment shall be installed in a neat and workmanlike manner.

Informational Note: Accepted industry practices are described in ANSI/NECA 1-2015, *Standard for Good Workmanship in Electrical Construction*, and other ANSI-approved installation standards.

(A) Unused Openings. Unused openings, other than those intended for the operation of equipment, those intended for mounting purposes, or those permitted as part of the design for listed equipment, shall be closed to afford protection substantially equivalent to the wall of the equipment. Where metallic plugs or plates are used with nonmetallic enclosures, they shall be recessed at least 6 mm (1/4 in.) from the outer surface of the enclosure.

(B) Integrity of Electrical Equipment and Connections. Internal parts of electrical equipment, including busbars, wiring terminals, insulators, and other surfaces, shall not be damaged or contaminated by foreign materials such as paint, plaster, cleaners, abrasives, or corrosive residues. There shall be no damaged parts that may adversely affect safe operation or mechanical strength of the equipment such as parts that are broken; bent; cut; or deteriorated by corrosion, chemical action, or overheating.

N **(C) Cables and Conductors.** Cables and conductors installed exposed on the surfaces of ceilings and sidewalls shall be supported by the building structure in such a manner that the cables and conductors will not be damaged by normal building use. Such cables and conductors shall be secured by hardware including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform with 300.4 and 300.11. Nonmetallic cable ties and other nonmetallic cable accessories used to secure and support cables in other spaces used for environmental air (plenums) shall be listed as having low smoke and heat release properties. Where straps or cable ties are installed exposed to sunlight, they shall be listed for exposure to ultraviolet light.

Informational Note No. 1: Accepted industry practices are described in ANSI/ NECA/FOA 301-2009, *Standard for Installing and Testing Fiber Optic Cables*, and other ANSI-approved installation standards.

Informational Note No. 2: See 4.3.11.2.6.5 and 4.3.11.5.5.6 of NFPA 90A-2018, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, for discrete combustible components installed in accordance with 300.22(C).

Informational Note No. 3: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants may result in an undetermined alteration of optical fiber cable properties.

110.13 Mounting and Cooling of Equipment.

(A) Mounting. Electrical equipment shall be firmly secured to the surface on which it is mounted. Wooden plugs riven into holes in masonry, concrete, plaster, or similar materials shall not be used.

(B) Cooling. Electrical equipment that depends on the natural circulation of air and convection principles for cooling of exposed surfaces shall be installed so that room airflow over such surfaces is not prevented by walls or by adjacent installed equipment. For equipment designed for floor mounting, clearance between top surfaces and adjacent surfaces shall be provided to dissipate rising warm air.

Electrical equipment provided with ventilating openings shall be installed so that walls or other obstructions do not prevent the free circulation of air through the equipment.

(C) Locations.

(1) Required Egress. Electrical equipment shall not project beyond the face of the wall or ceiling in halls, corridors, or other locations that would reduce the width or height required by the *Seattle Building Code* for such locations.

Informational Note: See Chapter 10 of the *Seattle Building Code* for prohibitions of electrical equipment within required means of egress system elements.

110.16 Arc-Flash Hazard Warning.

(A) General. Electrical equipment, such as switchboards, switchgear, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that is in other than dwelling units, and is likely to require examination, adjustment, servicing, or maintenance while energized, shall be field or factory marked to warn qualified persons of potential electric arc flash hazards. The marking shall meet the requirements in 110.21(B) and shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

Δ **(((~~(B) Service Equipment.~~** ~~In other than dwelling units, in addition to the requirements in (A), a permanent label shall be field or factory applied to service equipment rated 1200 amps or more. The label shall meet the requirements of 110.16(A) and contain the following information:~~

~~(1) Nominal system voltage~~

~~(2) Available fault current at the service overcurrent protective devices~~

~~(3) The clearing time of service overcurrent protective devices based on the available fault current at the service equipment.~~

~~(4) The date the label was applied Exception: Service equipment labeling shall not be required if an arc flash label is applied in accordance with acceptable industry practice.~~))

(B) Hazard Marking. In other than dwelling units, one or more markings shall be applied on site, to the equipment identified in 110.16(A) to identify specific arc-flash hazard(s). The marking shall be an identification plate or label

meeting ANSI Standard Z535.4- 2011, or be of a type that is approved by the authority having jurisdiction or designated representative. The plate or label shall include the name of the company or individual responsible for the arc-flash hazard analysis, the date of the analysis and all the following, as identified in NFPA 70E, Standard for Electrical Safety in the Workplace:

(1) Nominal system voltage;

(2) Arc-flash boundary; and

(3) At least one of the following:

(a) Available incident energy and the corresponding working distance, or the arc-flash PPE category for the equipment, but not both

(b) Minimum arc rating of clothing

(c) Site-specific level of PPE

Exception: Service equipment labeling shall not be required if an arc flash label is applied in accordance with acceptable industry practice.

Informational Note No. 1: *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, provides guidance, such as determining severity of potential exposure, planning safe work practices, arc flash labeling, and selecting personal protective equipment.

Informational Note No. 2: ANSI Z535.4-2011, *Product Safety Signs and Labels*, provides guidelines for the design of safety signs and labels for application to products.

Informational Note No. 3: Acceptable industry practices for equipment labeling are described in *NFPA 70E*-2018 *Standard for Electrical Safety in the Workplace*. This standard provides specific criteria for developing arc-flash labels for equipment that provides nominal system voltage, incident energy levels, arc-flash boundaries, minimum required levels of personal protective equipment, and so forth.

110.20 Electrified Fences and Similar Devices. Electrified fences, associated equipment and similar devices shall be permitted only by special permission from the authority having jurisdiction.

110.21 Marking.

(A) ((~~Equipment~~)) Manufacturer's Markings.

(1) General. The manufacturer's name, trademark or other descriptive marking by which the organization responsible for the product can be identified shall be placed on all electrical equipment. ((~~Other markings~~)) Markings that indicate voltage, current, wattage, or other ratings shall be provided as specified elsewhere in this Code. The marking or label shall be of sufficient durability to withstand the environment involved.

Δ **(2) Reconditioned Equipment.** Reconditioned equipment shall be marked with the name, trademark, or other descriptive marking by which the organization responsible for reconditioning the electrical equipment can be identified, along with the date of the reconditioning.

Reconditioned equipment shall be identified as "reconditioned" and the original listing mark removed. Approval of the reconditioned equipment shall not be based solely on the equipment's original listing.

Exception: In industrial occupancies, where conditions of maintenance and supervision ensure that only qualified persons service the equipment, the markings indicated in 110.21(A)(2) shall not be required for equipment that is reconditioned by the owner or operator as part of a regular equipment maintenance program.

Informational Note No. 1: Industry standards are available for application of reconditioned and refurbished equipment.

Informational Note No. 2: The term *reconditioned* may be interchangeable with the terms *rebuilt*, *refurbished*, or *remanufactured*.

Informational Note No. 3: The original listing mark may include the mark of the certifying body and not the entire equipment label.

Informational Note No. 4: See Sections 210.15, 240.62, 240.102 and 410.7 for electrical equipment that is not permitted to be reconditioned.

(B) Field-Applied Hazard Markings. Where caution, warning, or danger signs or labels are required by this *Code*, the labels shall meet the following requirements:

(1) The marking shall warn of the hazards using effective words, colors, symbols, or any combination thereof.

Informational Note: ANSI Z535.4-2011, *Product Safety Signs and Labels*, provides guidelines for suitable font sizes, words, colors, symbols, and location requirements for labels.

(2) The label shall be permanently affixed to the equipment or wiring method and shall not be handwritten.

Exception to (2): Portions of labels or markings that are variable, or that could be subject to changes, shall be permitted to be handwritten and shall be legible.

(3) The label shall be of sufficient durability to withstand the environment involved.

Informational Note: ANSI Z535.4-2011, *Product Safety Signs and Labels*, provides guidelines for the design and durability of safety signs and labels for application to electrical equipment.

(C) Other Marking or Labeling. Marking or labeling required by this Code shall be of sufficient durability to withstand the environment in which it is used. Unless otherwise required by this Code, both marking and labeling shall have lettering of not less than 6mm (1/4 in.) high and the letters shall be in contrast to the background. Marking or labeling shall be affixed using one of the following materials:

110.22 Identification of Disconnecting Means.

(A) General. Each disconnecting means shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident. In other than one- or two-family dwellings, the marking shall include the identification of the circuit source that supplies the disconnecting means. The marking shall be of sufficient durability to withstand the environment involved.

For the purpose of legibly marking a disconnecting means, as required by this section, an identification plate is required unless the disconnect is a circuit breaker or fused switch installed within a panelboard and the circuit breaker or fused switch is identified by a panelboard schedule. In other than one- or two-family dwellings, the identification plate must include the identification designation of the circuit source panelboard that supplies the disconnecting means.

Informational Note: WAC 296-46B-110.022—requirements for identification of disconnecting means is incorporated herein.

(B) Engineered Series Combination Systems. Equipment enclosures for circuit breakers or fuses applied in compliance with series combination ratings selected under engineering supervision in accordance with 240.86(A) shall be legibly marked in the field as directed by the engineer to indicate the equipment has been applied with a series combination rating. The marking shall meet the requirements in 110.21(B) and shall be readily visible and state the following:

CAUTION—ENGINEERED SERIES COMBINATION SYSTEM RATED _____ AMPERES.
IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.

(C) Tested Series Combination Systems. Equipment enclosures for circuit breakers or fuses are applied in compliance with the series combination ratings marked on the equipment by the manufacturer in accordance with 240.86(B) shall be legibly marked in the field to indicate the equipment has been applied with a series combination rating. The marking shall meet the requirements in 110.21(B) and shall be readily visible and state the following:

CAUTION—SERIES COMBINATION SYSTEM RATED _____ AMPERES.
IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.

Informational Note: See IEEE 3004.5-2014 *Recommended Practice for the Application of Low-Voltage Circuit Breakers in Industrial and Commercial Power Systems,* for further information on series tested systems.

110.26 Spaces About Electrical Equipment. Access and working space shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment.

(A) Working Space. Working space for equipment operating at 1000 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the dimensions of 110.26(A)(1), (A)(2), (A)(3), and (A)(4) or as required or permitted elsewhere in this *Code*.

Informational Note: *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, provides guidance, such as determining severity of potential exposure, planning safe work practices including establishing an electrically safe work condition, arc flash labeling, and selecting personal protective equipment.

(1) Depth of Working Space. The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A)(1)(a), (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed.

(a) *Dead-Front Assemblies.* Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards, switchgear, or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided.

(b) *Low Voltage.* By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

(c) *Existing Buildings.* In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, switchgear, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

(2) Width of Working Space. The width of the working space in front of the electrical equipment shall be the width of the equipment or 762 mm (30 in.), whichever is greater. In all cases, the work space shall permit at least a 90 degree opening of equipment doors or hinged panels.

Δ **(3) Height of Working Space.** The work space shall be clear and extend from the grade, floor, or platform to a height of 2.0 m (6 1/2 ft) or the height of the equipment, whichever is greater. Within the height requirements of this section, other equipment or support structures, such as concrete pads, associated with the electrical installation and located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment.

Exception No. 1: On battery systems mounted on open racks, the top clearance shall comply with 480.10(D).

Exception No. 2: In existing dwelling units, service equipment or panelboards that do not exceed 200 amperes shall be permitted by special permission in spaces where the height of the working space is less than 2.0 m (6 1/2 ft).

Exception No. 3: Meters that are installed in meter sockets shall be permitted to extend beyond the other equipment. The meter socket shall be required to follow the rules of this section.

(4) Limited Access. Where equipment operating at 1,000 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized is required by installation instructions or function to be located in a space with limited access, all of the following shall apply:

(1) Where equipment is installed above a lay-in ceiling, there shall be an opening not smaller than 559 mm × 559 mm (22 in. × 22 in.), or in a crawl space, there shall be an accessible opening not smaller than 559 mm × 762 mm (22 in. × 30 in.).

(2) The width of the working space shall be the width of the equipment enclosure or a minimum of 762 mm (30 in.), whichever is greater.

(3) All enclosure doors or hinged panels shall be capable of opening a minimum of 90 degrees.

(4) The space in front of the enclosure shall comply with the depth requirements of Table 110.26(A)(1). The maximum height of the working space shall be the height necessary to install the equipment in the limited space. A horizontal ceiling structural member or access panel shall be permitted in this space.

(5) Separation from High-Voltage Equipment. Where switches, cutouts, or other equipment operating at 1000 volts, nominal, or less are installed in a vault, room, or enclosure where there are exposed live parts or exposed wiring operating over 1000 volts, nominal, the high-voltage equipment shall be effectively separated from the space occupied by the low-voltage equipment by a suitable partition, fence, or screen.

(B) Clear Spaces. Working space required by this section shall not be used for storage. When normally enclosed live parts are exposed for inspection or servicing, the working space, if in a passageway or general open space, shall be suitably guarded.

(C) Entrance to and Egress from Working Space.

(1) Minimum Required. At least one entrance of sufficient area shall be provided to give access to and egress from working space about electrical equipment.

(2) Large Equipment. For large equipment that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6 1/2 ft) high at each end of the working space. This requirement shall apply to either of the following conditions:

(1) For equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide

(2) For service disconnecting means installed in accordance with 230.71 where the combined ampere rating is 1200 amperes or more and over 1.8 m (6 ft) wide

Open equipment doors shall not impede the entry to or egress from the working space.

A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C)(2)(a) or (C)(2)(b) is met.

(a) Unobstructed Egress. Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.

(b) Extra Working Space. Where the depth of the working space is twice that required by 110.26(A)(1), a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.

(3) Personnel Doors. Where equipment rated 800 amperes or more that contains overcurrent devices, switching devices, or control devices is installed and there is a personnel door(s) intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the door(s) shall open in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.

Informational Note: For information on panic hardware, see UL 305, *Standard For Safety For Panic Hardware*. For fire exit hardware, see UL 305, *Standard For Panic Hardware*, and UL 10C, *Standard for Safety for Positive Pressure Fire Tests of Door Assemblies*.

Δ **(D) Illumination.** Illumination shall be provided for all working spaces about service equipment, switchboards, switchgear, panelboards, or motor control centers installed indoors. Control by automatic means shall not be permitted to control all illumination within the working space. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as permitted by 210.70(A)(1),

<u>In residential installations, illumination shall be provided for all working spaces where branch circuits are installed outdoors.</u>

(E) Dedicated Equipment Space. All switchboards, switchgear, panelboards, and motor control centers shall be located in dedicated spaces and protected from damage.

Exception: Control equipment that by its very nature or because of other rules of the Code must be adjacent to or within sight of its operating machinery shall be permitted in those locations.

(1) Indoor. Indoor installations shall comply with 110.26(E)(1)(a) through (E)(1)(d).

(a) *Dedicated Electrical Space.* The space equal to the width and depth of the equipment and extending from the floor to a height of 1.8 m (6 ft) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Suspended ceilings with removable panels shall be permitted within the 1.8-m (6-ft) zone.

(b) *Foreign Systems.* The area above the dedicated space required by 110.26(E)(1)(a) shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks, or breaks in such foreign systems.

(c) *Sprinkler Protection.* Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.

(d) *Suspended Ceilings.* A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.

Δ **(2) Outdoor.** Outdoor installations shall comply with 110.26(E)(2)(a) through (E)(2)(c).

(a) *Installation Requirements.* Outdoor electrical equipment shall be the following:

(1) Installed in identified enclosures

(2) Protected from accidental contact by unauthorized personnel or by vehicular traffic

(3) Protected from accidental spillage or leakage from piping systems

(b) *Work Space.* The working clearance space shall include the zone described in 110.26(A). No architectural appurtenance or other equipment shall be located in this zone.

(c) *Dedicated Equipment Space*. The space equal to the width and depth of the equipment, and extending from grade to a height of 1.8 m (6 ft) above the equipment, shall be dedicated to the electrical installation. No piping or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Structural overhangs or roof extensions shall be permitted in this zone.

(F) Locked Electrical Equipment Rooms or Enclosures. Electrical equipment rooms or enclosures housing electrical apparatus that are controlled by a lock(s) shall be considered accessible to qualified persons.

Δ **110.30 General.** Conductors and equipment used on circuits over 1000 volts, nominal, shall comply with Part I of this article and with 110.30 through 110.41, which supplement or modify Part I. In no case shall this part apply to equipment on the supply side of the service point.

Each cable operating at over 1,000 Volts and installed on customer-owned systems, must be legibly marked in a permanent manner at each termination point and at each point where the cable is accessible. The required marking must use phase designation, operating voltage, and circuit number, if applicable.

Informational Note: WAC 296-46B-110(030), Requirements for Marking Cable Over 1,000 volts, is incorporated herein.

ARTICLE 200
Use and Identification of Grounded Conductors

200.4 Neutral conductors. Neutral conductors shall be installed in accordance with 200.4(A) and (B).

(A) Installation. Neutral conductors shall not be used for more than one branch circuit, for more than one multiwire branch circuit, or for more than one set of ungrounded feeder conductors, unless specifically permitted elsewhere in this *Code*.

(B) Multiple Circuits. Where more than one neutral conductor associated with different circuits is in an enclosure, grounded circuit conductors of each circuit shall be identified or grouped to correspond with the ungrounded circuit conductor(s) by wire markers, cable ties, or similar means in at least one location within the enclosure.

Exception No. 1: The requirement for grouping or identifying shall not apply if the branch-circuit or feeder conductors enter from a cable or a raceway unique to the circuit that makes the grouping obvious.

Exception No. 2: The requirements for grouping or identifying shall not apply where branch-circuit conductors pass through a box or conduit body without a loop as described in 314.16(B)(1) or without a splice or termination.

Informational Note: See Sections 210.4 and 215.4 for common neutral exceptions.

Δ **210.8 Ground-Fault Circuit-Interrupter Protection for Personnel.** Ground-fault circuit-interrupter protection for personnel shall be provided as required in 210.8(A) through (F). The ground-fault circuit interrupter shall be installed in a readily accessible location.

Informational Note No. 1: See 215.9 for ground-fault circuit-interrupter protection for personnel on feeders.

Informational Note No. 2: See 422.5(A) for GFCI requirements for appliances.

Informational Note No. 3: See 555.9 for GFCI requirements for boat hoists.

Informational Note No. 4: Additional GFCI requirements for specific circuits and equipment are contained in Chapters 4, 5, and 6.

For the purposes of this section, when determining the distance from receptacles the distance shall be measured as the shortest path the supply cord of an appliance connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier, or the shortest path without passing through a window.

(A) Dwelling Units. All 125-volt through 250-volt receptacles installed in the locations specified in 210.8(A)(1) through (A)(11) and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel.

(1) Bathrooms

(2) Garages and ((~~also~~)) accessory buildings that have a floor located at or below grade level not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use

Exception: A receptacle supplying only a permanently installed fire alarm or burglar alarm system shall not be required to have ground-fault circuit-interrupter protection. A red receptacle with a red cover plate supplying a fire alarm system is not required to have ground-fault circuit-interrupter protection. The receptacle must be identified for use only with the fire alarm system by an identification plate or engraved cover with letters at least 6.4 mm (1/4 in.) high.

Informational Note: WAC 296-46B-210.008 requirements for dwelling unit GFCI protection is incorporated herein with edits.

(3) Outdoors

Exception to (3): Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

(4) Crawl spaces — at or below grade level

(5) Basements

Exception No. 1 to (5): A receptacle supplying only a permanently installed fire alarm or burglar alarm system shall not be required to have ground-fault circuit-interrupter protection.

Exception No. 2 to (5): In an unfinished basement, a red receptacle with a red cover plate supplying a fire alarm system is not required to have ground-fault circuit-interrupter protection. The receptacle must be identified for use only with the fire alarm system by an identification plate or engraved cover with letters at least 1/4" high.

Informational Note: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems.

Receptacles installed under the exception to 210.8(A)(5) shall not be ((~~considered as meeting~~)) deemed to meet the requirements of 210.52(G).

(6) Kitchens — where the receptacles are installed to serve the countertop surfaces

(7) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink

(8) Boathouses

(9) Bathtubs or shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall

(10) Laundry areas

Exception to (1) through (3), (5) through (8), and (10): Listed locking support and mounting receptacles utilized in combination with compatible attachment fittings installed for the purpose of serving a ceiling luminaire or ceiling fan shall not be required to be ground-fault circuit-interrupter protected. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling fan, GFCI protection shall be provided.

Δ **(B) Other Than Dwelling Units.** All 125-volt through 250-volt receptacles supplied by single-phase branch circuits rated 150 volts or less to ground, 50 amperes or less, and all receptacles supplied by three-phase branch circuits rated 150 volts or less to ground, 100 amperes or less, installed in the locations specified in 210.8(B)(1) through (B)(12) shall have ground-fault circuit-interrupter protection for personnel.

(1) Bathrooms

(2) Kitchens or areas with a sink and permanent provisions for either food preparation or cooking including beverage preparation

(3) Rooftops

Exception: Receptacles on rooftops shall not be required to be readily accessible other than from the rooftop.

(4) Outdoors

Exception No. 1 to (3) and (4): Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2 to (4): In industrial establishments only, where the conditions of maintenance and supervision ensure that only qualified personnel are involved, an assured equipment grounding conductor program as specified in 590.6(B)(2) shall be permitted for only those receptacle outlets used to supply equipment that would create a greater hazard if power is interrupted or having a design that is not compatible with GFCI protection.

(5) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink

Exception No. 1 to (5): In industrial laboratories, receptacles used to supply equipment where removal of power would introduce a greater hazard shall be permitted to be installed without GFCI protection.

Exception No. 2 to (5): Receptacles located in patient bed locations of Category 2 (general care) or Category 1 (critical care) spaces of health care facilities shall be permitted to comply with 517.21.

(6) Indoor damp and wet locations

(7) Locker rooms with associated showering facilities

(8) Garages, accessory buildings, service bays, and similar areas other than vehicle exhibition halls and showrooms

(9) Crawl spaces — at or below grade level

(10) Unfinished areas of basements

Exception to (1) through (5), (8), and (10): Listed locking support and mounting receptacles utilized in combination with compatible attachment fittings installed for the purpose of serving a ceiling luminaire or ceiling fan shall not be required

to be ground-fault circuit-interrupter protected. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling fan, GFCI protection shall be provided.

(11) Laundry areas

(12) Bathtubs and shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall

(C) Crawl Space Lighting Outlets. GFCI protection shall be provided for lighting outlets not exceeding 120 volts installed in crawl spaces.

N **(D) Specific Appliances.** Unless GFCI protection is provided in accordance with 422.5(B)(3) through (B)(5), the outlets supplying the appliances specified in 422.5(A) shall have GFCI protection in accordance with 422.5(B)(1) or (B)(2).

Where the appliance is a vending machine as specified in 422.5(A)(5) and GFCI protection is not provided in accordance with 422.5(B)(3) or (B)(4), branch circuits supplying vending machines shall have GFCI protection in accordance with 422.5(B)(1) or (B)(2).

N **(E) Equipment Requiring Servicing.** GFCI protection shall be provided for the receptacles required by 210.63.

N **(F) Outdoor Outlets.** All outdoor outlets for dwellings, other than those covered in 210.8(A)(3), Exception to (3), that are supplied by single-phase branch circuits rated 150 volts to ground or less, 50 amperes or less, shall have ground-fault circuit-interrupter protection for personnel.

Exception: Ground-fault circuit-interrupter protection shall not be required on lighting outlets other than those covered in 210.8(C).

210.12 Arc-Fault Circuit-Interrupter Protection. Arc-fault circuit-interrupter protection shall be provided as required in 210.12(A), (B), (C), and (D). The arc-fault circuit interrupter shall be installed in a readily accessible location.

Δ **(A) Dwelling Units.** All 120-volt, single-phase, 15- and 20-ampere branch circuits supplying outlets or devices installed in dwelling unit kitchens, family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, laundry areas, or similar rooms or areas shall be protected by any of the means described in 210.12(A)(1) through (6):

(1) A listed combination-type arc-fault circuit interrupter installed to provide protection of the entire branch circuit listed branch/feeder-type AFCI installed at the origin of the branch-circuit in combination with a listed outlet branch-circuit-type arc-fault circuit interrupter installed at the first outlet box on the branch circuit. The first outlet box in the branch circuit shall be marked to indicate that it is the first outlet of the circuit.

(2) A listed supplemental arc protection circuit breaker installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type arc-fault circuit interrupter installed at the first outlet box on the branch circuit where all of the following conditions are met:

a. The branch-circuit wiring shall be continuous from the branch-circuit overcurrent device to the outlet branch-circuit arc-fault circuit interrupter.

b. The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.

c. The first outlet box in the branch circuit shall be marked to indicate that it is the first outlet of the circuit.

(3) A listed outlet branch-circuit-type arc-fault circuit interrupter installed at the first outlet on the branch circuit in combination with a listed branch-circuit overcurrent protective device where all of the following conditions are met:

a. The branch-circuit wiring shall be continuous from the branch-circuit overcurrent device to the outlet branch-circuit arc-fault circuit interrupter.

b. The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.

c. The first outlet box in the branch circuit shall be marked to indicate that it is the first outlet of the circuit.

d. The combination of the branch-circuit overcurrent device and outlet branch-circuit AFCI shall be identified as meeting the requirements for a system combination-type AFCI and shall be listed as such.

(5) If metal raceway, metal wireways, metal auxiliary gutters, or Type MC, or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, metal conduit bodies, and metal enclosures are installed for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install a listed outlet branch-circuit-type AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.

(6) Where a listed metal or nonmetallic conduit or tubing or Type MC cable is encased in not less than 50 mm (2 in.) of concrete for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install a listed outlet branch-circuit-type AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.

Exception: AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B)*. The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, Type MC or Type AC, meeting the applicable requirements of* 250.118*, with metal boxes, conduit bodies, and enclosures.*

Informational Note No. 1: For information on combination-type and branch/feeder-type arc-fault circuit interrupters, see UL 1699-2011, *Standard for Arc-Fault Circuit Interrupters*. For information on outlet branch-circuit type arc-fault circuit interrupters, see UL Subject 1699A, *Outline of Investigation for Outlet Branch Circuit Arc-Fault Circuit-Interrupters*. For information on system combination AFCIs, see UL Subject 1699C, *Outline of Investigation for System Combination Arc-Fault Circuit Interrupters*.

Informational Note No. 2: See 29.6.3(5) of *NFPA 72*-2013, *National Fire Alarm and Signaling Code*, for information related to secondary power-supply requirements for smoke alarms installed in dwelling units.

Informational Note No. 3: See 760.41(B) and 760.121(B) for power-supply requirements for fire alarm systems.

(B) Dormitory Units, Boarding Houses, and Congregate Living Facilities. All 120-volt, single-phase, 15- and 20-ampere branch circuits supplying outlets and devices installed in ((~~dormitory unit~~)) bedrooms, living rooms, hallways, closets, bathrooms, and similar rooms of dormitory units, boarding houses, and congregate living facilities shall be protected by any of the means described in 210.12(A)(1) through (6).

(C) Guest Rooms, Guest Suites, and Patient Sleeping Rooms in Nursing Homes and Limited-Care Facilities. All 120-volt, single-phase, 15- and 20-ampere branch circuits supplying outlets and devices installed in guest rooms and guest suites of hotels and motels and patient sleeping rooms in nursing homes and limited-care facilities shall be protected by any of the means described in 210.12(A)(1) through (6).

(D) Branch Circuit Extensions or Modifications — Dwelling Units, Dormitory Units, ((~~and~~)) Guest Rooms, ((~~and~~)) Guest Suites, Boarding Houses, and Congregate Living Facilities. Where branch circuit wiring for any of the areas specified in 210.12(A), (B), or (C) is modified, replaced, or extended, the branch circuit shall be protected by one of the following:

(1) By any of the means described in 210.12(A)(1) through (A)(6)

(2) A listed outlet branch-circuit-type AFCI located at the first receptacle outlet of the existing branch circuit

Exception: AFCI protection shall not be required where the extension of the existing branch circuit conductors is not more than 1.8 m (6 ft) and does not include any additional outlets or devices, other than splicing devices. This measurement shall not include the conductors inside an enclosure, cabinet, or junction box.

210.25 Branch Circuits in Buildings with More Than One Occupancy.

(A) Dwelling Unit Branch Circuits. Branch circuits in each dwelling unit shall supply only loads within that dwelling unit or loads associated only with that dwelling unit.

Δ **(B) Common Area Branch Circuits.** Branch circuits installed for lighting, central alarm, signal, communications, or other purposes for public or common areas of a two-family dwelling, a multifamily dwelling, or a multi-occupancy building shall not be supplied from equipment that supplies an individual dwelling unit or tenant space.

Exception to B: lighting for common exterior areas not exceeding 50 watts and controlled by a photocell and occupancy sensor.

Informational Note: Examples of public or common areas include, but are not limited to, lobbies, corridors, stairways, laundry rooms, roofs, elevators, washrooms, store rooms, driveways (parking), and mechanical rooms.

(C) Shared Sump Pump, Septic or Water Well. Branch circuits supplying loads for sump pump, septic or water well systems that are shared by no more than two dwelling units may be supplied from either of the two dwelling units if approved by the authority having jurisdiction and local health department.

Informational Note: WAC 296-46B-210.25, requirements for common area branch circuits for shared septic or water well systems, is incorporated herein with edits.

210.52 Dwelling Unit Receptacle Outlets. This section provides requirements for 125-volt, 15- and 20-ampere receptacle outlets. The receptacles required by this section shall be in addition to any receptacle that is as follows:

(1) Part of a luminaire or appliance, or

(2) Controlled by a listed wall-mounted control device in accordance with 210.70(A)(1), Exception No. 1, or

(3) Located within cabinets or cupboards, or

(4) Located more than 1.7 m (5 1/2 ft) above the floor

Permanently installed electric baseboard heaters equipped with factory-installed receptacle outlets or outlets provided as a separate assembly by the manufacturer shall be permitted as the required outlet or outlets for the wall space utilized by such permanently installed heaters. Such receptacle outlets shall not be connected to the heater circuits.

Informational Note: Listed baseboard heaters include instructions that may not permit their installation below receptacle outlets.

A dwelling unit, required by Chapter 11 of the *Seattle Building Code* to be an *Accessible Unit*, shall comply with the clearance and reach requirements contained in *Seattle Building Code* and as shown in *Informative Annex J* of the *2020 National Electric Code*.

(A) General Provisions. In every kitchen, family room, dining room, living room, parlor, library, den, sunroom, bedroom, recreation room, or similar room or area of dwelling units, receptacle outlets shall be installed in accordance with the general provisions specified in 210.52(A)(1) through (A)(4).

(1) Spacing. Receptacles shall be installed such that no point measured horizontally along the floor line of any wall space is more than 1.8 m (6 ft) from a receptacle outlet.

(2) Wall Space. As used in this section, a wall space shall include the following:

(1) Any space 600 mm (2 ft) or more in width (including space measured around corners) and unbroken along the floor line by doorways and similar openings, fireplaces, window seating and fixed cabinets ((~~that do not have countertops or similar work surfaces~~))or bookcases that extend from the floor to a level at least 1.7 m (5 ft 6 inches) above the floor, and similar openings. Any outlet eliminated by window seating, bookcases, cabinets, or other permanent part of the dwelling configuration or finish must be installed elsewhere within the room

(2) The space occupied by fixed panels in walls, excluding sliding panels

(3) The space afforded by fixed room dividers, such as freestanding bar-type counters or railings

Informational Note: WAC 296-46B-210.052(A)(2) ((~~6~~)) (7) explaining similar openings is incorporated herein with edits.

(3) Floor Receptacles. Receptacle outlets in or on floors shall not be counted as part of the required number of receptacle outlets unless located within 450 mm (18 in.) of the wall.

(4) Countertop Receptacles and Similar Work Surface Receptacle Outlets. Receptacles installed for countertop and similar work surfaces as specified in 210.52(C) shall not be considered as the receptacles outlets required by 210.52(A).

(B) Small Appliances.

(1) Receptacle Outlets Served. In the kitchen, pantry, breakfast room, dining room, or similar area of a dwelling unit, the two or more 20-ampere small-appliance branch circuits required by 210.11(C)(1) shall serve all wall and floor receptacle outlets covered by 210.52(A), all countertop outlets covered by 210.52(C), and receptacle outlets for refrigeration equipment.

Exception No. 1: In addition to the required receptacles specified by 210.52, switched receptacles supplied from a general-purpose 15- or 20-ampere branch circuit as required in 210.70(A)(1), Exception No. 1, shall be permitted.

Exception No. 2: In addition to the required receptacles specified by 210.52, a receptacle outlet to serve a specific appliance shall be permitted to be supplied from an individual branch circuit rated 15 amperes or greater.

(2) No Other Outlets. The two or more small-appliance branch circuits specified in 210.52(B)(1) shall have no other outlets.

Exception No. 1: A receptacle installed solely for the electrical supply to and support of an electric clock in any of the rooms specified in 210.52(B)(1).

Exception No. 2: Receptacles installed to provide power for supplemental equipment and lighting on gas-fired ranges, ovens, or counter-mounted cooking units.

(3) Kitchen Receptacle Requirements. Receptacles installed in a kitchen to serve countertop surfaces shall be supplied by not fewer than two small-appliance branch circuits, either or both of which shall also be permitted to supply receptacle outlets in the same kitchen and in other rooms specified in 210.52(B)(1). Additional small-appliance branch circuits shall be permitted to supply receptacle outlets in the kitchen and other rooms specified in 210.52(B)(1). No small-appliance branch circuit shall serve more than one kitchen.

(C) Countertops and Work Surfaces. In kitchens, pantries, breakfast rooms, dining rooms, and similar areas of dwelling units, receptacle outlets for countertop and work surfaces that are 300 mm (12 in.) or wider shall be installed in accordance with 210.52(C)(1)through (C)(3) and shall not be considered as the receptacle outlets required by 210.52(A).

For the purposes of this section, where using multioutlet assemblies, each 300 mm (12 in.) of multioutlet assembly containing two or more receptacles installed in individual or continuous lengths shall be considered to be one receptacle outlet.

Δ **(1) Wall Spaces.** Receptacle outlets shall be installed so that no point along the wall line is more than 600 mm (24 in.) measured horizontally from a receptacle outlet in that space.

Exception: Receptacle outlets shall not be required directly behind a range, counter-mounted cooking unit, or sink in the installation described in Figure 210.52(C)(1).

N **(2) Island and Peninsular Countertops and Work Surfaces.** Receptacle outlets shall be installed in accordance with 210.52(C)(2)(a) and (C)(2)(b).

(a) At least one receptacle outlet shall be provided for the first 0.84 m^2 (9 ft^2), or fraction thereof, of the countertop or work surface. A receptacle outlet shall be provided for every additional 1.7 m^2 (18 ft^2), or fraction thereof, of the countertop or work surface.

(b) At least one receptacle outlet shall be located within 600 mm (2 ft) of the outer end of a peninsular countertop or work surface. Additional required receptacle outlets shall be permitted to be located as determined by the installer, designer, or building owner. The location of the receptacle outlets shall be in accordance with 210.52(C)(3).

A peninsular countertop shall be measured from the connected perpendicular wall.

(3) Receptacle Outlet Location. Receptacle outlets shall be located in one or more of the following:

(1) On or above countertop or work surfaces: On or above, but not more than 500 mm (20 in.) above, the countertop or work surface.

(2) In countertop or work surfaces: Receptacle outlet assemblies listed for use in countertops or work surfaces shall be permitted to be installed in countertops or work surfaces.

(3) Below countertop or works surfaces: Not more than 300 mm (12 in.) below the countertop or work surface. Receptacles installed below a countertop or work surface shall not be located where the countertop or work surface extends more than 150 mm (6 in.) beyond its support base.

Receptacle outlets rendered not readily accessible by appliances fastened in place, appliance garages, sinks, or rangetops as covered in 210.52(C)(1), Exception, or appliances occupying assigned spaces shall not be considered as these required outlets.

Informational Note No. 1: See 406.5(E) and 406.5(G) for installation of receptacles in countertops and 406.5(F) and 406.5(G) for installation of receptacles in work surfaces. See 380.10 for installation of multioutlet assemblies.

Informational Note No. 2: See Annex J and ANSI/ICC A117.1-2009, *Standard on Accessible and Usable Buildings and Facilities*.

(D) Bathrooms. At least one receptacle outlet shall be installed in bathrooms within 900 mm (3 ft) of the outside edge of each basin. The receptacle outlet shall be located on a wall or partition that is adjacent to the basin or basin countertop, located on the countertop, or installed on the side or face of the basin cabinet. In no case shall the receptacle be located more than 300 mm (12 in.) below the top of the basin or basin countertop. Receptacle outlet assemblies listed for use in countertops shall be permitted to be installed in the countertop.

Informational Note: See 406.5(E) and 406.5(G) for requirements for installation of receptacles in countertops.

(E) Outdoor Outlets. Outdoor receptacle outlets shall be installed in accordance with 210.52(E)(1) through (E)(3).

Informational Note: See 210.8(A)(3).

(1) One-Family and Two-Family Dwellings. For a one-family dwelling and each unit of a two-family dwelling that is at grade level, at least one receptacle outlet readily accessible from grade and not more than 2.0 m (6 1/2 ft) above grade level shall be installed at the front and back of the dwelling.

(2) Multifamily Dwellings. For each dwelling unit of a multifamily dwelling where the dwelling unit is located at grade level and provided with individual exterior entrance/egress, at least one receptacle outlet readily accessible from grade and not more than 2.0 m (6 1/2 ft) above grade level shall be installed.

(3) Balconies, Decks, and Porches. Balconies, decks, and porches that are within 102 mm (4 in.) horizontally of the dwelling unit shall have at least one receptacle outlet accessible from the balcony, deck, or porch. The receptacle outlet shall not be located more than 2.0 m (6 1/2 ft) above the balcony, deck, or porch walking surface.

(F) Laundry Areas. In dwelling units, at least one receptacle outlet shall be installed in areas designated for the installation of laundry equipment.

Exception No. 1: A receptacle for laundry equipment shall not be required in a dwelling unit of a multifamily building where laundry facilities are provided on the premises for use by all building occupants.

Exception No. 2: A receptacle for laundry equipment shall not be required in other than one-family dwellings where laundry facilities are not to be installed or permitted.

(G) Basements, Garages, and Accessory Buildings. For one- and two-family dwellings, and multifamily dwellings, at least one receptacle outlet shall be installed in the areas specified in 210.52(G)(1) through (G)(3). These receptacles shall be in addition to receptacles required for specific equipment.

(1) Garages. In each attached garage and in each detached garage with electric power, at least one receptacle outlet shall be installed in each vehicle bay and not more than 1.7 m (5 1/2 ft) above the floor.

Exception: Garage spaces not attached to an individual dwelling unit of a multifamily dwelling shall not require a receptacle outlet in each vehicle bay.

(2) Accessory Buildings. In each accessory building with electric power.

(3) Basements. In each separate unfinished portion of a basement.

(H) Hallways. In dwelling units, hallways of 3.0 m (10 ft) or more in length shall have at least one receptacle outlet.

As used in this subsection, the hallway length shall be considered the length along the centerline of the hallway without passing through a doorway.

(I) Foyers. Foyers that are not part of a hallway in accordance with 210.52(H) and that have an area that is greater than 5.6 m^2 (60 ft^2) shall have a receptacle(s) located in each wall space 900 mm (3 ft) or more in width. Doorways, door-side windows that extend to the floor, and similar openings shall not be considered wall space.

210.65 Meeting Rooms.

(A) General. Each meeting room of not more than 93 m^2 (1000 ft^2) in other than dwelling units shall have outlets for nonlocking-type, 125-volt, 15- or 20-ampere receptacles. The outlets shall be installed in accordance with 210.65(B). Where a room or space is provided with movable partition(s), each room size shall be determined with the partition in the position that results in the smallest size meeting room.

Informational Note No. 1: For the purposes of this section, meeting rooms are typically designed or intended for the gathering of seated occupants for such purposes as conferences, deliberations, or similar purposes, where portable electronic equipment such as computers, projectors, or similar equipment is likely to be used.

Informational Note No. 2: Examples of rooms that are not meeting rooms include auditoriums, schoolrooms, and coffee shops.

(B) Receptacle Outlets Required. The total number of receptacle outlets, including floor outlets and receptacle outlets in fixed furniture, shall not be less than as determined in (1) and (2).

(1) Receptacle Outlets in Fixed Walls. The required number of receptacle outlets shall be determined in accordance with 210.52(A)(1) through (A)(4). These receptacle outlets shall be permitted to be located as determined by the installer, designer, or building owner.

(2) Floor Outlets. A meeting room with any floor dimension that is 3.7 m (12 ft) or greater in any direction and that has a floor area of at least 20 m^2 (215 ft^2) shall have at least one floor receptacle outlet, or at least one floor outlet to serve receptacle(s), located in or on the floor at a distance not less than 1.8 m (6 ft) from any fixed wall for each 20 m^2 (215 ft^2) or major portion of floor space.

Informational Note No. 1: See 314.27(B) for floor boxes used for receptacles located in the floor.

Informational Note No. 2: See Article 518 for assembly occupancies designed for 100 or more persons.

215.4 Feeders with Common Neutral Conductor.

(A) Feeders with Common Neutral. Up to three sets of 3-wire feeders or two sets of 4-wire or 5-wire feeders shall be permitted to utilize a common neutral.

Informational Note: See Section 200.4 for common neutral.

(B) In Metal Raceway or Enclosure. Where installed in a metal raceway or other metal enclosure, all conductors of all feeders using a common neutral conductor shall be enclosed within the same raceway or other enclosure as required in 300.20.

215.13 Panelboards. Panelboards, existing or installed in an individual unit of multifamily dwellings, shall be supplied by one feeder, except by special permission from the authority having jurisdiction.

215.14 One Dwelling Unit Not to Be Supplied Through Another. Feeder conductors supplying electricity to an individual dwelling unit shall not pass through another dwelling unit.

For the purpose of this section, a dwelling unit is defined as the area between the unit floor-surface and the subfloor or attic of the unit above. Walls between individual dwelling units may contain feeders supplying the contiguous dwelling units. Common area walls may be used for routing feeders.

Article 220
Branch-Circuit, Feeder, and Service Load

220.12 Lighting Load for Non-Dwelling Occupancies.

Δ **(A) General.** A unit load of not less than that specified in Table 220.12 for non-dwelling occupancies and the floor area determined in 220.11 shall be used to calculate the minimum lighting load. Motors rated less than 1/8 hp and connected to a lighting circuit shall be considered general lighting load.

Informational Note: The unit values of Table 220.12 are based on minimum load conditions and 100 percent power factor and may not provide sufficient capacity for the installation contemplated.

N (B) Energy Code. Where the building is designed and constructed to comply with an energy code adopted by the local authority, the lighting load shall be permitted to be calculated using the unit values specified in the energy code where the following conditions are met:

((~~(1) A power monitoring system is installed that will provide continuous information regarding the total general lighting load of the building.~~

~~(2) The power monitoring system will be set with alarm values to alert the building owner or manager if the lighting load exceeds the values set by the energy code. Automatic means to take action to reduce the connected load shall be permitted.~~))

((~~(3)~~)) 1) The demand factors specified in 220.42 are not applied to the general lighting load.

((~~(4)~~)) 2) The continuous load multiplier of 125 percent shall be applied.

Informational Note: See Section 403 of the 2018 Seattle Energy Code for the unit values.

220.51 Fixed Electric Space Heating. Fixed electric space-heating loads shall be calculated at 100 percent of the total connected load. However, in no case shall a feeder or service load current rating be less than the rating of the largest branch circuit supplied.

Exception: ((~~Where reduced loading of the conductors results from units operating on duty cycle, intermittently, or from all units not operating at the same time, the authority having jurisdiction may grant permission for feeder and service conductors to have an ampacity less than 100 percent, provided the conductors have an ampacity for the load so determined.~~)) A demand factor of 75 percent of the installed heating capacity may be used in sizing service entrance and feeder equipment for dwelling, commercial, and industrial occupancies when electric service is provided to four or more fixed space heaters, or electric furnaces individually controlled. These exceptions shall not apply when optional calculations allowed by Section 220.84 are used.

220.52 Small-Appliance and Laundry Loads—Dwelling Unit.

(A) Small-Appliance Circuit Load. In each dwelling unit, the load shall be calculated at 1500 volt-amperes for each 2-wire small-appliance branch circuit as covered by 210.11(C)(1). Where the load is subdivided through two or more feeders, the calculated load for each shall include not less than 1500 volt-amperes for each 2-wire small-appliance branch circuit. These loads shall be permitted to be included with the general lighting load and subjected to the demand factors provided in Table 220.42.

Exception: The individual branch circuit permitted by 210.52(B)(1), Exception No. 2, shall be permitted to be excluded from the calculation required by 220.52.

(B) Laundry Circuit Load. A load of not less than 1500 volt-amperes shall be included for each 2-wire laundry branch circuit installed as covered by 210.11(C)(2). This load shall be permitted to be included with the general lighting load and shall be subjected to the demand factors provided in Table 220.42.

220.53 Appliance Load—Dwelling Unit(s). It shall be permissible to apply a demand factor of 75 percent to the nameplate rating load of four or more appliances fastened in place, other than electric ranges, clothes dryers, space-heating equipment, or air-conditioning equipment, that are served by the same feeder or service in a one-family, two-family, or multifamily dwelling. For space heating equipment, see Section 220.51.

220.53 Appliance Load — Dwelling Unit(s). It shall be permissible to apply a demand factor of 75 percent to the nameplate rating load of four or more appliances rated 1/4 hp or greater, or 500 watts or greater, that are fastened in place, and that are served by the same feeder or service in a one-family, two-family, or multifamily dwelling. This demand factor shall not apply to:

(1) Household electric cooking equipment that is fastened in place

(2) Clothes dryers

(3) Space heating equipment

(4) Air-conditioning equipment

To determine the loading of space heating equipment, see Section 220.51

220.57 Electric Vehicle Demand Load. Electric vehicle–ready demand load shall be calculated based on the load needed for the number of electric vehicle–ready parking spaces required by 625.27 (A) or (B).

220.84 Multifamily Dwelling.

(A) Feeder or Service Load. It shall be permissible to calculate the load of a feeder or service that supplies three or more dwelling units of a multifamily dwelling in accordance with Table 220.84 instead of Part III of this article if all the following conditions are met:

(1) No dwelling unit is supplied by more than one feeder.

(2) Each dwelling unit is equipped with electric cooking equipment.

Exception: When the calculated load for multifamily dwellings without electric cooking in Part III of this article exceeds that calculated under Part IV for the identical load plus electric cooking (based on 8 kW per unit), the lesser of the two loads shall be permitted to be used.

(3) Each dwelling unit is equipped with either electric space heating or air conditioning, or both. Feeders and service conductors whose calculated load is determined by this optional calculation shall be permitted to have the neutral load determined by 220.61.

Exception: When the calculated load for multifamily dwellings without electric heating or air conditioning, or both in Part III of this article exceeds that calculated under Part IV for the identical load plus electric heating (based on 5 W per square foot or the actual heat loss calculations based on the energy code at 140% as approved by the mechanical review in BTU), the lesser of the two loads shall be permitted to be used.

(B) House Loads. House loads shall be calculated in accordance with Part III of this article and shall be in addition to the dwelling unit loads calculated in accordance with Table 220.84.

(C) Calculated Loads. The calculated load to which the demand factors of Table 220.84 apply shall include the following:

(1) 33 volt-amperes/m^2 or 3 volt-amperes/ft^2 for general lighting and general-use receptacles

(2) 1500 volt-amperes for each 2-wire, 20-ampere small-appliance branch circuit and each laundry branch circuit covered in 210.11(C)(1) and (C)(2)

(3) The nameplate rating of the following:

a. All appliances that are fastened in place, permanently connected, or located to be on a specific circuit (including EV charger when powered from the unit panel)

b. Ranges, wall-mounted ovens, counter-mounted cooking units

c. Clothes dryers that are not connected to the laundry branch circuit specified in item (2)

d. Water heaters

(4) The nameplate ampere or kVA rating of all permanently connected motors not included in item (3)

(5) The larger of the air-conditioning load or the fixed electric space-heating load.

225.17 Masts as Supports. Only feeder or branch-circuit conductors specified within this section shall be permitted to be attached to the feeder and/or branch-circuit mast. Masts used for the support of final spans of feeders or branch circuits shall be installed in accordance with ((~~225.17(A) and (B)~~)) 230.28.

(((A) Strength. ~~The mast shall have adequate strength or be supported by braces or guy wires to safely withstand the strain imposed by the overhead feeder or branch-circuit conductors. Hubs intended for use with a conduit serving as a mast for support of feeder or branch-circuit conductors shall be identified for use with a mast.~~

~~**(B) Attachment.** Feeder and/or branch-circuit conductors shall not be attached to a mast where the connection is between a weatherhead or the end of the conduit and a coupling where the coupling is located above the last point of securement to the building or other structure, or where the coupling is located above the building or other structure.~~))

Part II Buildings or Other Structures Supplied by a Feeder(s) or Branch Circuits

Δ **225.32 Location.**

(A) Location-General. The disconnecting means shall be installed either inside or outside of the building or structure served or where the conductors pass through the building or structure. The disconnecting means shall be at a readily accessible location nearest the point of entrance of the conductors. For the purposes of this section, the requirements in 230.6 shall be utilized.

Exception No. 1: For installations under single management, where documented safe switching procedures are established and maintained for disconnection, and where the installation is monitored by qualified individuals, the disconnecting means shall be permitted to be located elsewhere on the premises.

E*xception No. 2: For buildings or other structures qualifying under Article 685, the disconnecting means shall be permitted to be located elsewhere on the premises.*

Exception No. 3: For towers or poles used as lighting standards, the disconnecting means shall be permitted to be located elsewhere on the premises.

Exception No. 4: For poles or similar structures used only for support of signs installed in accordance with Article 600, the disconnecting means shall be permitted to be located elsewhere on the premises.

(B) Location of outside feeder disconnecting means. A disconnecting means must be provided to disconnect all ungrounded conductors that supply or pass through a building or structure with the following exceptions.

Exception No. 1: A feeder disconnecting means, including that required by Articles 700, 701, or 702 of this Code for a generator, is considered to be in the building if installed on the outside of the building or structure or within sight and within 15 feet of the building or structure. The building disconnecting means may supply only one building or structure unless the secondary building(s) or structure(s) has a separate building disconnecting means meeting the requirements of this Code and this subsection. The disconnecting means must have an identification plate with at least one-half-inch high letters which identify:

(a) the building or structure served; and
(b) the disconnecting means function as the building or structure main disconnect(s).

Exception No. 2: The feeder disconnecting means may be installed anywhere inside a building or structure when there is a feeder disconnecting means, located elsewhere on the premises, with overcurrent protection sized for the feeder conductors.

(C) A generator disconnecting means. Generator disconnecting means installed per subsection (1)(a) or (b), is not required to be suitable for use as service equipment.

Informational Note: WAC 296-46B-225.032 requirements for the location of outside feeder disconnecting means is incorporated herein.

ARTICLE 230
Services

230.1 ((~~Scope~~)) General.

(A) Scope. This article covers service conductors and equipment for control and protection of services and their installation requirements.

Informational Note: See Figure 230.1, Services.

(B) Service Requirements. The serving utility shall be consulted by the owner, the owner's agent, or the contractor making the installation regarding service entrance location before installing equipment. Provisions for metering equipment, attachment of service-drop, or an underground service lateral shall be made at a location acceptable to the serving utility.

230.2 Number of Services. A building or other structure served shall be supplied by only one service unless permitted in 230.2(A) through (D). For the purpose of 230.40, Exception No. 2 only, underground sets of conductors, 1/0 AWG and larger, running to the same location and connected together at their supply end but not connected together at their load end shall be considered to be supplying one service.

(A) Special Conditions. Additional services shall be permitted to supply the following:

(1) Fire pumps

(2) Emergency systems

(3) Legally required standby systems

(4) Optional standby systems

(5) Parallel power production systems

(6) Systems designed for connection to multiple sources of supply for the purpose of enhanced reliability

(B) Special Occupancies. By special permission, additional services shall be permitted for either of the following:

(1) Multiple-occupancy buildings where there is no available space for service equipment accessible to all occupants

(2) A single building or other structure sufficiently large to make two or more services necessary

(C) Capacity Requirements. Additional services shall be permitted under any of the following:

(1) Where the capacity requirements are in excess of 2,000 amperes at a supply voltage of 1,000 volts or less

(2) Where the load requirements of a single-phase installation are greater than the serving agency normally supplies through one service

(3) By special permission

(4) Electrical vehicle charging

(D) Different Characteristics. Additional services shall be permitted for different voltages, frequencies, or phases, or for different uses, such as for different rate schedules.

(E) Identification. Where a building or structure is supplied by more than one service, or any combination of branch circuits, feeders, and services, a permanent plaque or directory shall be installed at each service disconnect location denoting all other services, feeders, and branch circuits supplying that building or structure and the area served by each. See 225.37.

230.3 One Building or Other Structure Not to Be Supplied Through Another. Service conductors supplying a building or other structure shall not pass through the interior of another building or other structure.

230.4 Service Entrance Conductors Serving Development Sites. Service entrance conductors from one development site shall not serve another development site or premises.

230.5 Types of Services. All services shall be grounded single-phase or grounded three-phase 4-wire systems. Three-phase 3-wire services shall not be installed unless prior approval is granted by the utility and the authority having jurisdiction.

230.12 Service Point Connection. Service point connections shall comply with paragraphs (A), (B) or (C) below.

(A) Overhead service-drop. For overhead service-drop conductors from the utility pole to the point of attachment to the building, connections of the service entrance conductors shall be at a weatherhead outside the building.

(B) Underground Service Connections Outside of Buildings. For underground service connections outside of buildings, connection shall be made in one of the following:

(1) a service terminal box or current transformer cabinet;

(2) a handhole or power transformer installed outdoors in accordance with requirements of the utility, the Seattle Building Code, or any other applicable ordinance;

(3) A meter socket(s) of 200 amperes minimum size, direct-metered;

(4) A termination compartment of service equipment that is used exclusively for the connection of the utility distribution system.

(C) Underground Service Connections Inside of Buildings. For underground service connections inside of buildings, connection shall be made at one of the following:

(1) Where utility-supplied conductors are used:

(a) service terminal box or current transformer cabinet connected by no more than 457 mm (18 in.) of rigid steel or rigid nonmetallic conduit inside the building;

(b) a direct metered, flush mounted meter socket of 200 amperes minimum size mounted in a perimeter wall of a single-family dwelling connected by no more than 2.4 m (8 ft) of rigid steel or rigid nonmetallic conduit inside the building;

(c) a termination or current transformer section of built, sectionalized service equipment that is used exclusively for the connection of the utility distribution system. This section must be fed from underground or concrete encased conduit and the service equipment must be set directly on the floor or a concrete house

(2) a transformer vault within the building

230.20 Overhead Service Conductors. Overhead service conductors between a service point and connections to service entrance conductors that are 1,000 volts or less are not permitted.

230.22 ((~~Insulation or Covering.~~ ~~Individual conductors shall be insulated or covered.~~)) **Reserved.**

((~~Exception: The grounded conductor of a multiconductor cable shall be permitted to be bare~~.))

230.23 ((~~Size and Ampacity~~)) Reserved.

(((~~(A) General.~~ ~~Conductors shall have sufficient ampacity to carry the current for the load as calculated in accordance with Article 220 and shall have adequate mechanical strength.~~

~~(B) Minimum Size.~~ ~~The conductors shall not be smaller than 8 AWG copper or 6 AWG aluminum or copper-clad aluminum.~~

~~Exception: Conductors supplying only limited loads of a single branch circuit - such as small polyphase power, controlled water heaters, and similar loads - shall not be smaller than 12 AWG hard-drawn copper or equivalent.~~

~~(C) Grounded Conductors.~~ ~~The grounded conductor shall not be less than the minimum size as required by 250.24(C).~~

230.24 ((~~Clearances.~~ ~~Overhead service conductors shall not be readily accessible and shall comply with 230.24(A) through (E) for services not over 1000 volts, nominal.~~)) **Reserved.**

(((~~(A) Above Roofs.~~ ~~Conductors shall have a vertical clearance of not less than 2.5 m (8 ft) above the roof surface. The vertical clearance above the roof level shall be maintained for a distance of not less than 900 mm (3 ft) in all directions from the edge of the roof.~~

~~*Exception No. 1: The area above a roof surface subject to pedestrian or vehicular traffic shall have a vertical clearance from the roof surface in accordance with the clearance requirements of 230.24(B). Exception No. 2: Where the voltage between conductors does not exceed 300 and the roof has a slope of 100 mm in 300 mm (4 in. in 12 in.) or greater, a reduction in clearance to 900 mm (3 ft) shall be permitted.*~~

~~*Exception No. 3: Where the voltage between conductors does not exceed 300, a reduction in clearance above only the overhanging portion of the roof to not less than 450 mm (18 in.) shall be permitted if (1) no more than 1.8 m (6 ft) of overhead service conductors, 1.2 m (4 ft) horizontally, pass above the roof overhang, and (2) they are terminated at a through-the-roof raceway or approved support.*~~

~~Informational Note: See 230.28 for mast supports.~~

~~*Exception No. 4: The requirement for maintaining the vertical clearance 900 mm (3 ft) from the edge of the roof shall not apply to the final conductor span where the service drop or overhead service conductors are attached to the side of a building.*~~

~~*Exception No. 5: Where the voltage between conductors does not exceed 300 and the roof area is guarded or isolated, a reduction in clearance to 900 mm (3 ft) shall be permitted.*~~

~~**(B) Vertical Clearance for Overhead Service Conductors.** Overhead service conductors, where not in excess of 600 volts, minimal, shall have the following minimum clearance from final grade:~~

~~(1) 3.0 m (10 ft) – at the electrical service entrance to buildings, also at the lowest point of the drip loop of the building electrical entrance, and above areas or sidewalks accessible only to pedestrians, measured from final grade or other accessible surface only for overhead service conductors supported on and cabled together with a grounded bare messenger where the voltage does not exceed 150 volts to ground~~

~~(2) 3.7 m (12 ft) – over residential property and driveways, and those commercial areas not subject to truck traffic where the voltage does not exceed 300 volts to ground~~

~~(3) 4.5 m (15 ft) – for those areas listed in the 3.7 m (12 ft) classification where the voltage exceeds 300 volts to ground~~

~~(4) 5.5 m (18 ft) – over public streets, alleys, roads, parking areas subject to truck traffic, driveways on other than residential property, and other land such as cultivated, grazing, forest, and orchard.~~

~~(5) 7.5 m (24 1/2 ft) over tracks of railroads~~

~~**(C) Clearance from Building Openings.** See 230.9.~~

~~**(D) Clearance from Swimming Pools.** See 680.9.~~

~~**(E) Clearance from Communication Wires and Cables.** Clearance from communication wires and cables shall be in accordance with 800.44(A)(4).~~))

230.26 ((~~Point of Attachment.~~ ~~The point of attachment of the overhead service conductors to a building or other structure shall provide the minimum clearances as specified in 230.9 and 230.24. In no case shall this point of attachment be less than 3.0 m (10 ft) above finished grade.~~)) **Reserved.**

230.27 ((~~Means of Attachment.~~ ~~Multiconductor cables used for overhead service conductors shall be attached to buildings or other structures by fittings identified for use with service conductors. Open conductors shall be attached to fittings identified for use with service conductors or to noncombustible, nonabsorbent insulators securely attached to the building or other structure.~~)) **Reserved.**

230.28 Service Masts as Supports. Only electrical utility ((~~power service-drop or overhead service~~)) conductors shall be ((~~permitted to be~~)) attached to a service mast. Service masts used for the support of electrical utility ((~~service-drop or overhead service drops~~)) conductors shall ((~~be installed in accordance with 230.28(A) and (B).~~)) comply with all of the following:

(((A) Strength. ~~The service mast shall be of adequate strength or be supported by braces or guy wires to withstand safely the strain imposed by the service-drop or overhead service conductors. Hubs intended for use with a conduit that serves as a service mast shall be identified for use with service-entrance equipment.~~

~~**(B) Attachment.** Service drop or overhead service conductors shall not be attached to a service mast between a weatherhead or the end of the conduit and a coupling, where the coupling is located above the last point of securement to the building or other structure or is located above the building or other structure.~~))

(A) Be of rigid steel galvanized conduit having a diameter no smaller than 51 mm (2 in.).

(B) Have raceway fittings identified for use with galvanized rigid steel (GRC).

(C) Support only electric utility conductors.

(D) Be attached to a bracket on the mast or other approved structure located with 610 mm (24 in.) of the mast.

(E) Support service conduits by one of the methods identified in WAC 296-46B-230 028 and drawings E-101 through E-103 with corresponding notes. Snuggle bars properly installed between wood framing members are permitted.

(F) Be rigidly supported with brackets or guy wires for masts extending over 661 mm (26 in.) from upper supporting means.

Informational Note: The serving utility shall be consulted for bracket and guy wire requirements,

(G) Have openings protected by approved neoprene or lead flashing to create a watertight seal where service conduit passes through the roof.

(H) Locate couplings only below the roofline and below a point of support for the mast.

Informational Note: WAC 296-46B-230.028, requirements for service mast installations, is incorporated herein.

230.29 Supports over Buildings and Wires on or about Buildings or Structures over Water. ((~~Service conductors passing over a roof shall be securely supported by substantial structures. For a grounded system, where the substantial structure is metal, it shall be bonded by means of a bonding jumper and listed connector to the grounded overhead service conductor. Where practicable, such supports shall be independent of the building.~~))

(A) All service entrance conductors for piers, docks, wharves, and other structures over water shall terminate in a disconnecting means or service equipment at the street side or end of such structure, or as otherwise approved by the authority having jurisdiction.

Exception: When the vault for the utility transformer is located over water, a disconnecting means for the service entrance conductors shall be provided immediately outside the vault at a location acceptable to the authority having jurisdiction.

Informational Note: For utility service conductors on piers, docks, or wharves, refer to *"Requirements for Electric Service Connection,"* published by Seattle City Light.

(B) Service entrance conduit containing wires not protected by circuit breakers or switches and fuses shall follow and be supported on parapets or other walls and shall not be laid upon or across roofs.

(C) All service entrance conduits in the Fire District shall terminate on the side of the building nearest to the lines or mains of the utility. The service shall not terminate over adjacent private property, and shall extend to the street or alley wall of the buildings.

Informational Note**:** The *Seattle Building Code* defines "Fire District" in Chapter 2.

(D) Open wiring for service conductors shall contact the building at only one point except where the utility will agree to contact the building at more than one point.

(E) No wire access fittings or junction boxes of any type shall be permitted within 4.6 m (15 ft) of the ground level on street, alley, or driveway margins.

Part III. Underground Service Conductors

230.30 Installation.

(A) Insulation. Underground service conductors shall be insulated for the applied voltage.

Exception: A grounded conductor shall be permitted to be uninsulated as follows:
(1) Bare copper used in a raceway
(2) Bare copper for direct burial where bare copper is approved to be suitable for the soil conditions
(3) Bare copper for direct burial without regard to soil conditions where part of a cable assembly identified for underground use
(4) Aluminum or copper-clad aluminum without individual insulation or covering where part of a cable assembly identified for underground use in a raceway or for direct burial

(B) Wiring Methods. Underground service conductors shall be installed in accordance with the applicable requirements of this *Code* covering the type of wiring method used and shall be limited to the following methods:

(1) Type RMC conduit

(2) Type IMC conduit

(3) Type NUCC conduit

(4) Type HDPE conduit

(5) Type PVC conduit

(6) Type RTRC conduit

((~~(7) Type IGS cable~~

~~(8) Type USE conductors or cables~~

~~(9) Type MV or Type MC cable identified for direct burial applications~~

~~(10)~~)) (7) Type MI cable, where suitably protected against physical damage and corrosive conditions

Part IV. Service-Entrance Conductors

230.40 ((~~Number of~~)) Service-Entrance Conductor Sets.

(A) Number of Service-Entrance Conductor Sets. Each service drop((~~, set of overhead service conductors~~)), set of underground service conductors, or service lateral shall ((~~supply only one set of service-entrance conductors~~)) not leave the development site.

NOTE: See SEC 230.4 for additional information about service-entrance conductor sets serving development sites.

((~~Exception No. 1: A building with more than one occupancy shall be permitted to have one set of service-entrance conductors for each service, as permitted in 230.2, run to each occupancy or group of occupancies. If the number of service disconnect locations for any given classification of service does not exceed six, the requirements of 230.2(E) shall apply at each location. If the number of service disconnect locations exceeds six for any given supply classification, all service disconnect locations for all supply characteristics, together with any branch circuit or feeder supply sources, if applicable, shall be clearly described using graphics or text, or both, on one or more plaques located in an approved, readily accessible location(s) on the building or structure served and as near as practicable to the point(s) of attachment or entry(ies) for each service drop or service lateral and for each set of overhead or underground service conductors.~~))

Exception No. ((~~2~~)) 1: Where two to six service disconnecting means in separate enclosures are grouped at one location and supply separate loads from one service drop,((~~set of overhead service conductors,~~)) set of underground service conductors, or service lateral, one set of service-entrance conductors shall be permitted to supply each or several such service equipment enclosures.

((~~Exception No. 3: A one-family dwelling unit and its accessory structures shall be permitted to have one set of service-entrance conductors run to each from a single service drop, set of overhead service conductors, set of underground service conductors, or service lateral.~~))

Exception No. ((~~4~~)) 2: Two-family dwellings, multifamily dwellings, and multiple occupancy buildings shall be permitted to have one set of service-entrance conductors installed to supply the circuits covered in 210.25.))

Exception No. ((~~5~~)) 3: One set of service-entrance conductors connected to the supply side of the normal service disconnecting means shall be permitted to supply each or several systems covered by 230.82(5) or 230.82(6).

(B) Two-family and multiple-occupancy buildings. A second or additional service drop or lateral to a building having more than one occupancy will be permitted to be installed at a location separate from other service drops or laterals to the building, provided that all the following conditions are complied with:

(1) Each service drop or lateral must be sized in accordance with the NEC for the calculated load to be served by the conductors;

(2) Each service drop or lateral must terminate in listed metering or service equipment;

(3) Each occupant must have access to the occupant's service disconnecting means;

(4) No more than 6 service disconnects may be supplied from a single transformer;

(5) All service drops or laterals supplying a building must originate at the same transformer or power supply;

(6) A permanent identification plate must be placed at each service disconnect location that identifies all other service disconnect locations in or on the building, the area or units served by each, the total number of service disconnecting means on the building or structure and the area or units served. If a structure consists of multiple buildings (i.e., by virtue of fire separation), all service disconnects in or on the entire structure must be labeled to identify all service disconnects in or on the structure; and

(7) A permanent identification plate must be placed at each feeder disconnecting means identifying the area or units served if the feeder disconnecting means is remote from the area or unit served.

Informational Note: WAC 296-46B-230.040(5), requirements for second or additional service conductors, is incorporated herein with edits.

230.42 Minimum Size and Ampacity.

Δ **(A) General.** Service-entrance conductors shall have an ampacity of not less than the maximum load to be served. Conductors shall be sized not less than the largest of 230.42(A)(1) or (A)(2). Loads shall be determined in accordance with Part III, IV, or V of Article 220, as applicable. Ampacity shall be determined from 310.14 and shall comply with 110.14(C). The maximum current of busways shall be that value for which the busway has been listed or labeled.

Informational Note: For information on busways, *see UL 857, Standard for Safety for Busways.*

(1) Where the service-entrance conductors supply continuous loads or any combination of noncontinuous and continuous loads, the minimum service-entrance conductor size shall have an ampacity not less than the sum of the noncontinuous loads plus 125 percent of continuous loads.

Exception No. 1: Grounded conductors that are not connected to an overcurrent device shall be permitted to be sized at 100 percent of the sum of the continuous and noncontinuous load.

Exception No. 2: The sum of the noncontinuous load and the continuous load if the service-entrance conductors terminate in an overcurrent device where both the overcurrent device and its assembly are listed for operation at 100 percent of their rating shall be permitted.

(2) The minimum service-entrance conductor size shall have an ampacity not less than the maximum load to be served after the application of any adjustment or correction factors.

(B) Specific Installations. In addition to the requirements of 230.42(A), the minimum ampacity for ungrounded conductors for specific installations shall not be less than the rating of the service disconnecting means specified in 230.79(A) through (D).

(C) Grounded Conductors. The grounded conductor shall not be smaller than the minimum size as required by 250.24(C).

(D) Ungrounded Conductors. If the service conductors have a lesser ampacity than the rating of service equipment with multiple service disconnects permitted by Sections 230.90 or 310.15, or the equipment rating that they terminate in or on, an identification plate showing the ampacity of the conductors must be installed on the service equipment.

Informational Note: WAC 296-46B-230.042(6), requirement for labeling of service equipment, is incorporated herein with edits.

230.43 Wiring Methods for 1000 Volts, Nominal, or Less. Service-entrance conductors shall be installed in accordance with the applicable requirements of this Code covering the type of wiring method used and shall be limited to the following methods:

(1) ((~~Open wiring on insulators~~)) Reserved

(2) ((~~Type IGS cable~~)) Reserved

(3) Rigid metal conduit (RMC)

(4) Intermediate metal conduit (IMC)

(5) ((~~Electrical metallic tubing (EMT)~~)) Reserved

(6) ((~~Electrical nonmetallic tubing~~)) Reserved

(7) ((~~Service-entrance cables~~)) Reserved

(8) ((~~Wireways~~)) Reserved

(9) Busways

(10) ((~~Auxiliary gutters~~)) Reserved

(11) Rigid polyvinyl chloride conduit (PVC)

(12) Cablebus

(13) Type MC cable that complies with Section 330.10(A)(11), with prior approval of the authority having jurisdiction

(14) Mineral-insulated, metal-sheathed cable, Type MI

(15) ((~~Flexible metal conduit (FMC) not over 1.8 m (6 ft) long or liquidtight flexible metal conduit (LFMC) not over 1.8 m (6 ft) long between a raceway, or between a raceway and service equipment, with a supply-side bonding jumper routed with the flexible metal conduit (FMC) or the liquidtight flexible metal conduit (LFMC) according to 250.102(A), (B), (C), and (E)~~)) Reserved

(16) ((~~Liquidtight flexible nonmetallic conduit LFNC~~)) Reserved

17) High density polyethylene conduit (HDPE)

(18) Nonmetallic underground conduit with conductors (NUCC)

(19) Reinforced thermosetting resin conduit (RTRC)

((~~(20) Type TC-ER cable~~))

230.44 Cable Trays. Cable tray systems ((~~shall~~)) may with prior approval of the authority having jurisdiction, be permitted to support service-entrance conductors. Cable trays used to support service-entrance conductors shall contain only service-entrance conductors and shall be limited to the following methods:

((~~(1) Type SE cable~~

~~(2)~~)) (1) Type MC cable

((~~(3)~~)) (2) Type MI cable

((~~(4) Type IGS cable~~

~~(5) Single conductors 1/0 and larger that are listed for use in cable tray~~

~~(6) Type TC-ER cable~~))

Such cable trays shall be identified with permanently affixed labels with the wording "Service-Entrance Conductors." The labels shall be located so as to be visible after installation with a spacing not to exceed 3 m (10 ft) so that the service-entrance conductors are able to be readily traced through the entire length of the cable tray.

Exception: Conductors, other than service-entrance conductors, shall be permitted to be installed in a cable tray with service-entrance conductors, provided a solid fixed barrier of a material compatible with the cable tray is installed to separate the service-entrance conductors from other conductors installed in the cable tray.

230.46 Spliced and Tapped Conductors. Service-entrance conductors shall be permitted to be spliced or tapped in accordance with 110.14, 300.5(E), 300.13, and 300.15, only by special permission of the authority having jurisdiction. Power distribution blocks, pressure connectors, and devices for splices and taps shall be listed. Power distribution blocks installed on service conductors shall be marked "suitable for use on the line side of the service equipment" or equivalent.

Effective January 1, 2023, pressure connectors and devices for splices and taps installed on service conductors shall be marked "suitable for use on the line side of the service equipment" or equivalent.

230.50 Protection Against Physical Damage.

(A) Underground Service-Entrance Conductors. Underground service-entrance conductors shall be protected against physical damage in accordance with 300.5.

(B) All Other Service-Entrance Conductors. All other service entrance conductors, other than underground service entrance conductors, shall be protected against physical damage ((~~as specified in 230.50(B)(1) or (B)(2).~~

~~**(1) Service-Entrance Cables.** Service-entrance cables, where subject to physical damage, shall be protected by any of the following:~~

~~(1) Rigid metal conduit (RMC)~~

~~(2) Intermediate metal conduit (IMC)~~

~~(3) Schedule 80 PVC conduit~~

~~(4) Electrical metallic tubing (EMT)~~

~~(5) Reinforced thermosetting resin conduit (RTRC)~~

~~(6) Other approved means~~

~~**(2) Other Than Service-Entrance Cables.** Individual open conductors and cables, other than service-entrance cables, shall not be installed within 3.0 m (10 ft) of grade level or where exposed to physical damage.~~

~~*Exception: Type MI and Type MC cable shall be permitted within 3.0 m (10 ft) of grade level where not exposed to physical damage or where protected in accordance with 300.5(D).*~~

~~**230.51 Mounting Supports.** Service-entrance cables or individual open service-entrance conductors shall be supported as specified in 230.51(A), (B), or (C).~~

~~**(A) Service-Entrance Cables.** Service-entrance cables shall be supported by straps or other approved means within 300 mm (12 in.) of every service head, gooseneck, or connection to a raceway or enclosure and at intervals not exceeding 750 mm (30 in.).~~

~~**(B) Other Cables.** Cables that are not approved for mounting in contact with a building or other structure shall be mounted on insulating supports installed at intervals not exceeding 4.5 m (15 ft) and in a manner that maintains a clearance of not less than 50 mm (2 in.) from the surface over which they pass.~~

~~**(C) Individual Open Conductors.** Individual open conductors shall be installed in accordance with Table 230.51(C). Where exposed to the weather, the conductors shall be mounted on insulators or on insulating supports attached to racks, brackets, or other approved means. Where not exposed to the weather, the conductors shall be mounted on glass or porcelain knobs.~~))

Table 230.51(C), Supports, is not adopted.

((~~**230.52 Individual Conductors Entering Buildings or Other Structures.** Where individual open conductors enter a building or other structure, they shall enter through roof bushings or through the wall in an upward slant through~~

~~individual, noncombustible, nonabsorbent insulating tubes. Drip loops shall be formed on the conductors before they enter the tubes.~~))

230.54 Overhead Service-Drop Locations.

(A) Service Head. Service raceways shall be equipped with a service head at the point of connection to service-drop or ((~~overhead service~~)) conductors. The service head shall be listed for use in wet locations.

(B) ((~~Service-Entrance Cables Equipped with Service Head or Gooseneck.~~ ~~Service-entrance cables shall be equipped with a service head. The service head shall be listed for use in wet locations.~~)) **Reserved.**

((~~Exception: Type SE cable shall be permitted to be formed in a gooseneck and taped with a self-sealing weather-resistant thermoplastic.~~))

(C) Service Heads and Goosenecks Above Service-Drop. ((~~or Overhead Service Attachment.~~)) Service heads on raceways or service-entrance ((~~cables~~)) conductors and goosenecks in service-entrance cables shall be located above the point of attachment of the service-drop ((~~or overhead service conductors~~)) to the building or other structure.

Exception: Where it is impracticable to locate the service head or gooseneck above the point of attachment, the service head or gooseneck location shall be permitted not farther than 600 mm (24 in.) from the point of attachment.

(D) ((~~Secured.~~ ~~Service-entrance cables shall be held securely in place.~~)) **Reserved.**

(E) Separately Bushed Openings. Service heads shall have conductors of different potential brought out through separately bushed openings.

((~~Exception: For jacketed multiconductor service-entrance cable without splice.~~))

(F) Drip Loops. Drip loops shall be formed on individual conductors. To prevent the entrance of moisture, service entrance conductors shall be connected to the service-drop ((~~or overhead service~~)) conductors either (1) below the level of the service head or (2) below the level of the termination of the service-entrance cable sheath.

(G) Arranged That Water Will Not Enter Service Raceway or Equipment. Service-entrance ((~~and overhead service~~)) conductors shall be arranged so that water will not enter service raceway or equipment.

(H) Length at Weatherhead. Service-entrance conductors shall extend at least 457 mm (18 in.) from the weatherhead to allow connection. Where multiple service-entrance raceways are provided, each service-entrance conductor shall extend at least 762 mm (30 in.) from the weatherhead to allow connection.

Informational Note: Drawings E-101, E-102, and E-103 adopted in Section 230.28 of this *Code* and contained in WAC 296-46B-230 together with the associated drawing notes, illustrate code compliant installations.

Part VI. Service Equipment—Disconnecting Means

Δ **230.70 General.** Means shall be provided to disconnect all ungrounded conductors in a building or other structure from the service entrance conductors.

(A) Location. The service disconnecting means shall be installed in accordance with 230.70(A)(1), (A)(2), ((~~and~~)) (A)(3), and (A)(4).

(1) Readily Accessible Location. ((~~The service disconnecting means shall be installed at a readily accessible location either outside of a building or structure or inside nearest the point of entrance of the service conductors.~~)) Service disconnecting means shall be in a readily accessible location including after any subsequent building alterations or additions as follows:

(a) Outside location. Service disconnecting means will be permitted on the building or structure or within sight and within 15 feet of the building or structure served. The building disconnecting means may supply only one building or structure. The service disconnecting means must have an identification plate with one-half-inch high letters identifying:

(1) The building or structure served; and

(2) Its function as the building or structure main service disconnect(s).

Informational Note: WAC 296-46B-230.001, requirements for inside and outside readily accessible location, are incorporated herein.

(b) Inside location. When the service disconnecting means is installed inside the building or structure, it must be located so that the service raceway extends no more than 15 feet inside the building or structure.

(2) Bathrooms and Other Wet Locations. Service disconnecting means shall not be installed in bathrooms, toilet rooms, or shower rooms, nor above washers, water heaters, sinks, plumbing fixtures, or drain boards.

(3) Other Locations. Service disconnecting means shall not be installed in clothes closets, cupboards, or attics, nor under or over stairways, nor within any stairway enclosure nor over ranges and dryers.

Exception: In one- and two-family dwellings, service disconnecting means may be installed over a stairway landing that has no less than the clear working space required by this Code.

((~~(3)~~)) (4) Remote Control. Where a remote control device(s) is used to actuate the service disconnecting means, the service disconnecting means shall be located in accordance with 230.70(A)(1).

(B) Marking. Each service disconnect shall be permanently marked to identify it as a service disconnect.

(C) Suitable for Use. Each service disconnecting means shall be suitable for the prevailing conditions. Service equipment installed in hazardous (classified) locations shall comply with the requirements of Articles 500 through 517.

230.82 Equipment Connected to the Supply Side of Service Disconnect. Only the following equipment shall be permitted to be connected to the supply side of the service disconnecting means:

(1) ((~~Cable~~)) Existing installation of cable limiters by special permission of the authority having jurisdiction.

(2) Meters and meter sockets nominally rated not in excess of 1000 volts, if all metal housings and service enclosures are grounded in accordance with Part VII and bonded in accordance with Part V of Article 250. Taps under meter socket lugs shall not be permitted, except by prior approval from the authority having jurisdiction.

(3) Meter disconnect switches nominally rated not in excess of 1000 volts that have a short-circuit current rating equal to or greater than the available fault current, if all metal housings and service enclosures are grounded in accordance with Part VII and bonded in accordance with Part V of Article 250. A meter disconnect switch shall be capable of interrupting the load served. A meter disconnect shall be legibly field marked on its exterior in a manner suitable for the environment as follows:

METER DISCONNECT
NOT SERVICE EQUIPMENT

(4) Instrument transformers (current and voltage), impedance shunts, load management devices, surge arresters, and Type 1 surge-protective devices.

(5) Conductors used to supply load management devices, circuits for standby power systems, fire pump equipment, and fire and sprinkler alarms, if provided with service equipment and installed in accordance with requirements for service-entrance conductors.

(6) Solar photovoltaic systems, fuel cell systems, wind electric systems, energy storage systems, or interconnected electric power production sources, if provided with a disconnecting means listed as suitable for use as service equipment, and overcurrent protection as specified in Part VII of Article 230.

(7) Control circuits for power-operable service disconnecting means, if suitable overcurrent protection and disconnecting means are provided.

(8) Ground-fault protection systems or Type 2 surge-protective devices, where installed as part of listed equipment, if suitable overcurrent protection and disconnecting means are provided.

(9) Connections used only to supply listed communications equipment under the exclusive control of the serving electric utility, if suitable overcurrent protection and disconnecting means are provided. For installations of equipment by the serving electric utility, a disconnecting means is not required if the supply is installed as part of a meter socket, such that access can only be gained with the meter removed.

(10) Emergency disconnects in accordance with 230.85, if all metal housings and service enclosures are grounded in accordance with Part VII and bonded in accordance with Part V of Article 250.

(11) Meter-mounted transfer switches nominally rated not in excess of 1000 volts that have a short-circuit current rating equal to or greater than the available fault current. A meter-mounted transfer switch shall be listed and be capable of transferring the load served. A meter-mounted transfer switch shall be marked on its exterior with both of the following:

a. Meter-mounted transfer switch

b. Not service equipment

(12) Current transformer cabinets shall contain only the main service conductors, metering equipment, secondary wiring, and bonding conductors. One tap shall be permitted on the load side of the current transformers for a legally required standby service and one tap shall be permitted on the load side of the current transformers for a fire pump service. One additional normal power service tap from the current transformer enclosure may be made by special permission of the service utility. In a single-family dwelling, two connections shall be permitted on the load side of the current transformers. No other taps shall be permitted. Approved terminal lugs shall be provided for the main service conductors, and for all taps and bonding conductors.

(13) Listed service accessory bus gutters or termination boxes that are approved for use on the line side of service equipment. Junction and pull boxes are not permitted except as allowed in (6) of this section.

230.90 Where Required. Each ungrounded service conductor shall have overload protection. If the service conductors have a lesser ampacity than the rating of service equipment with multiple service disconnects permitted by Sections 230.90 or 310.15 of this *Code*, an identification plate showing the ampacity of the conductors must be installed on the service equipment.

Informational Note: WAC 296-46B-230.042(6), requirements for service conductor size and rating, is incorporated herein with edits.

Δ **(A) Ungrounded Conductor.** Such protection shall be provided by an overcurrent device in series with each ungrounded service conductor that has a rating or setting not higher than the ampacity of the conductor. A set of fuses shall be considered all the fuses required to protect all the ungrounded conductors of a circuit. Single-pole circuit breakers, grouped in accordance with 230.71(B), shall be considered as one protective device.

Exception No. 1: For motor-starting currents, ratings that comply with 430.52, 430.62, and 430.63 shall be permitted.

Exception No. 2: Fuses and circuit breakers with a rating or setting that complies with 240.4(B) or (C) and 240.6 shall be permitted.

Exception No. 3: Two to six circuit breakers or sets of fuses shall be permitted as the overcurrent device to provide the overload protection. The sum of the ratings of the circuit breakers or fuses shall be permitted to exceed the ampacity of the service conductors, proved the calculated load does not exceed the ampacity of the service conductors.

Exception No. 4: Overload protection for fire pump supply conductors shall comply with 695.4(B)(2)(a).

Exception No. 5: Overload protection for 120/240-volt, 3-wire, single-phase dwelling services shall be permitted in accordance with the requirements of 310.12.

(B) Not in Grounded Conductor. No overcurrent device shall be inserted in a grounded service conductor except a circuit breaker that simultaneously opens all conductors of the circuit.

230.95 Ground-Fault Protection of Equipment. Ground-fault protection of equipment shall be provided for solidly grounded wye electric services of more than 150 volts to ground but not exceeding 1,000 volts phase-to-phase for each service disconnect rated 1,000 amperes or more. The grounded conductor for the solidly grounded wye system shall be connected directly to ground through a grounding electrode system, as specified in 250.50, without inserting any resistor or impedance device.

The rating of the service disconnect shall be considered to be the rating of the largest fuse that can be installed or the highest continuous current trip setting for which the actual overcurrent device installed in a circuit breaker is rated or can be adjusted.

Exception: The ground-fault protection provisions of this section shall not apply to a service disconnect for a continuous industrial process where a nonorderly shutdown will introduce additional or increased hazards.

(A) Setting. The ground-fault protection system shall operate to cause the service disconnect to open all ungrounded conductors of the faulted circuit. The maximum setting of the ground-fault protection shall be 1,200 amperes, and the maximum time delay shall be one second for ground-fault currents equal to or greater than 3,000 amperes.

(B) Fuses. If a switch and fuse combination is used, the fuses employed shall be capable of interrupting any current higher than the interrupting capacity of the switch during a time that the ground-fault protective system will not cause the switch to open.

(C) Performance Testing. The ground-fault protection system shall be performance tested when first installed on site. ((~~This testing shall be conducted by a qualified person(s) using a test process of primary current injection, in accordance with instructions that shall be provided with the equipment. A written record of this testing shall be made and shall be available to the authority having jurisdiction.~~))

The testing shall verify that the system is installed and operates in accordance with the manufacturer's instructions. Testing shall be performed by qualified personnel having proper equipment to complete the acceptance testing in the manner prescribed by the manufacturer. The testing personnel shall sign a written performance acceptance test record. The record shall provide testing details including, but not limited to, measurements and trip settings used during the test.

The written acceptance test record, together with a copy of the manufacturer's performance testing instructions, shall be made available to the inspector for the authority having jurisdiction.

(D) Added Ground-Fault Protection System. Ground fault protection systems added to an existing energized service shall be tested and inspected prior to being placed into service.

Informational Note No. 1: Ground-fault protection that functions to open the service disconnect affords no protection from faults on the line side of the protective element. It serves only to limit damage to conductors and equipment on the load side in the event of an arcing ground fault on the load side of the protective element.

Informational Note No. 2: This added protective equipment at the service equipment may make it necessary to review the overall wiring system for proper selective overcurrent protection coordination. Additional installations of ground-fault protective equipment may be needed on feeders and branch circuits where maximum continuity of electric service is necessary.

Informational Note No. 3: Where ground-fault protection is provided for the service disconnect and interconnection is made with another supply system by a transfer device, means or devices may be needed to ensure proper ground-fault sensing by the ground-fault protection equipment.

Informational Note No. 4: See 517.17(A) for information on where an additional step of ground-fault protection is required for hospitals and other buildings with critical areas or life support equipment.

230.200 General. Service conductors and equipment used on circuits exceeding 1000 volts, nominal, shall comply with all the applicable preceding sections of this article and with the following sections that supplement or modify the preceding sections. In no case shall the provisions of Part VIII apply to equipment on the supply side of the service point.

Informational Note No. 1: For clearances of conductors of over 1000 volts, nominal, see ANSI/IEEE C2-2017, *National Electrical Safety Code*.

Informational Note No. 2: WAC 296-46B-230.200 requirements for marking cable over 1,000 volts marking is incorporated herein.

230.202 Service-Entrance Conductors. Service-entrance conductors to buildings or enclosures shall be installed to conform to 230.202(A) and (B).

(A) Conductor Size. Service-entrance conductors shall not be smaller than 6 AWG unless in multiconductor cable. Multiconductor cable shall not be smaller than 8 AWG.

(B) Wiring Methods. Service-entrance conductors shall be installed by one of the following wiring methods: ((~~covered in 300.37 and 300.50.~~))

(1) Rigid metal conduit (RMC)

(2) Intermediate metal conduit (IMC)

(3) Schedule 80 rigid polyvinyl chloride (PVC) conduit

(4) Busways

(5) Cablebus

(6) Cable trays only with prior permission of the authority having jurisdiction.

ARTICLE 240
Overcurrent Protection

240.24 Location in or on Premises.

(A) Accessibility. ((~~Circuit breakers and switches containing fuses~~)) Equipment containing overcurrent devices shall be readily accessible. ((~~and installed so that the center of the grip of the operating handle of the switch or circuit breaker, when in its highest position, is not more than 2.0 m (6 ft 7 in.) above the floor or working platform, unless one of the following applies:~~))

Exceptions:
(1) For busways, as provided in 368.17(C).
(2) For supplementary overcurrent protection, as described in 240.10.
(3) For overcurrent devices, as described in 225.40 and 230.92.
(4) For overcurrent devices adjacent to utilization equipment that they supply, access shall be permitted to be by portable means.
(5) For enclosures approved to be pad- or floor-mounted.

(1) Exterior installations. Overcurrent devices shall be installed so that the center of the grip of the operating handle of the switch or circuit breaker, when in its highest position, is not more than 2.0 m (6 ft 7 in.) and not less than 24 inches above the exterior finished grade.

(2) Interior installations. Equipment containing over-current protection in interior installations shall be placed so that the lowest possible overcurrent device is no less than one foot (12 inches) above the floor or working platform.

Exception: The use of a tool shall be permitted to access overcurrent devices located within listed industrial control panels or similar enclosures.

Informational Note No. 1: WAC 296-46B-240-024(C), Not exposed to physical damage, is incorporated herein with edits.

(B) Occupancy. Each occupant shall have ready access to all overcurrent devices protecting the conductors supplying that occupancy, unless otherwise permitted in 240.24(B)(1) and (B)(2).

(1) Service and Feeder Overcurrent Devices. Where electric service and electrical maintenance are provided by the building management and where these are under continuous building management supervision, the service overcurrent devices and feeder overcurrent devices supplying more than one occupancy shall be permitted to be accessible only to authorized management personnel in the following:

(1) Multiple-occupancy buildings

(2) Guest rooms or guest suites

(3) Boarding homes and congregate living facilities or similar occupancies.

(2) Branch-Circuit Overcurrent Devices. Where electric service and electrical maintenance are provided by the building management and where these are under continuous building management supervision, the branch-circuit overcurrent devices supplying any guest rooms or guest suites without permanent provisions for cooking shall be permitted to be accessible only to authorized management personnel.

(3) Accessory Dwelling Unit, Two-Family and Multifamily Occupancies. Branch circuit overcurrent devices shall be located either within the dwelling unit that they serve or in common areas accessible to all occupants.

(C) Not Exposed to Physical Damage. Overcurrent devices shall be located where they will not be exposed to physical damage.

Informational Note: See 110.11, Deteriorating Agents.

(D) Not in Vicinity of Easily Ignitible Material. Overcurrent devices shall not be located in the vicinity of easily ignitable material, such as in clothes closets.

(E) Not Located in Bathrooms. In dwelling units, dormitory units, and guest rooms or guest suites, overcurrent devices, other than supplementary overcurrent protection, shall not be located in bathrooms.

(F) Not Located over Steps. Overcurrent devices shall not be located over steps of a stairway.

Δ **240.33 Vertical Position.** Enclosures for overcurrent devices shall be mounted in a vertical position. Circuit breaker enclosures shall be permitted to be installed horizontally where the circuit breaker is installed in accordance with 240.81. Listed busway plug-in units shall be permitted to be mounted in orientations corresponding to the busway mounting position, when in accordance with 240.81 and 404.7.

ARTICLE 250
Grounding and Bonding

250.53 Grounding Electrode System Installation.

(A) Rod, Pipe, and Plate Electrodes. Rod, pipe, and plate electrodes shall meet the requirements of 250.53(A)(1) through (A)(3).

(1) Below Permanent Moisture Level. If practicable, rod, pipe, and plate electrodes shall be embedded below permanent moisture level. Rod, pipe, and plate electrodes shall be free from nonconductive coatings such as paint or enamel.

(2) Supplemental Electrode Required. A single rod, pipe, or plate electrode shall be supplemented by an additional electrode of a type specified in 250.52(A)(2) through (A)(8). The supplemental electrode shall be permitted to be bonded to one of the following:

(1) Rod, pipe, or plate electrode

(2) Grounding electrode conductor

(3) Grounded service-entrance conductor

(4) Nonflexible grounded service raceway

(5) Any grounded service enclosure

Exception: ((~~If a single rod, pipe, or plate grounding electrode has a resistance to earth of 25 ohms or less, the supplemental electrode shall not be required~~.)) Only one ground rod is required for a temporary service or where one of the following service components is replaced:
(1) Mast
(2) Meter
(3) Panelboard

(3) Supplemental Electrode. If multiple rod, pipe, or plate electrodes are installed to meet the requirements of this section, they shall not be less than ((~~1.8 m (6 ft~~)) 2.5 m (8 ft) apart.

Informational Note: The paralleling efficiency of rods is increased by spacing them twice the length of the longest rod.

(4) Rod and Pipe Electrodes. The electrode shall be installed such that at least 2.44 m (8 ft) of length is in contact with the soil. It shall be driven to a depth of not less than 2.44 m (8 ft) except that, where rock bottom is encountered, the electrode shall be driven at an oblique angle not to exceed 45 degrees from the vertical or, where rock bottom is encountered at an angle up to 45 degrees, the electrode shall be permitted to be buried in a trench that is at least 750 mm (30 in.) deep. The upper end of the electrode shall be flush with or below ground level unless the above ground end and the grounding electrode conductor attachment are protected against physical damage as specified in 250.10.

(5) Plate Electrode. Plate electrodes shall be installed not less than 750 mm (30 in.) below the surface of the earth.

(B) Electrode Spacing. Where more than one of the electrodes of the type specified in 250.52(A)(5) or (A)(7) are used, each electrode of one grounding system (including that used for strike termination devices) shall not be less than 1.83 m (6 ft) from any other electrode of another grounding system. Two or more grounding electrodes that are bonded together shall be considered a single grounding electrode system.

(C) Bonding Jumper. The bonding jumper(s) used to connect the grounding electrodes together to form the grounding electrode system shall be installed in accordance with 250.64(A), (B), and (E), shall be sized in accordance with 250.66, and shall be connected in the manner specified in 250.70. Rebar shall not be used as a conductor to interconnect the electrodes of grounding electrode systems.

(D) Metal Underground Water Pipe. If used as a grounding electrode, metal underground water pipe shall meet the requirements of 250.53(D)(1) and (D)(2).

(1) Continuity. Continuity of the grounding path or the bonding connection to interior piping shall not rely on water meters or filtering devices and similar equipment.

Δ **(2) Supplemental Electrode Required.** A metal underground water pipe shall be supplemented by an additional electrode of a type specified in 250.52(A)(2) through (A)(8). If the supplemental electrode is of the rod, pipe, or plate type, it shall comply with 250.53(A). The supplemental electrode shall be bonded to one of the following:

(1) Grounding electrode conductor

(2) Grounded service-entrance conductor

(3) Nonflexible grounded service raceway

(4) Any grounded service enclosure

(5) As provided by 250.32(B)

Exception 1: The supplemental electrode shall be permitted to be bonded to the interior metal water piping as specified in 250.68(C)(1).

Exception 2: A temporary construction service is not required to have more than one made electrode.

(E) Supplemental Electrode Bonding Connection Size. Where the supplemental electrode is a rod, pipe, or plate electrode, that portion of the bonding jumper that is the sole connection to the supplemental grounding electrode shall not be required to be larger than 6 AWG copper wire or 4 AWG aluminum wire.

(F) Ground Ring. The ground ring shall be installed not less than 750 mm (30 in.) below the surface of the earth.

250.64 Grounding Electrode Conductor Installation. Grounding electrode conductors at the service, at each building or structure where supplied by a feeder(s) or branch circuit(s), or at a separately derived system shall be installed as specified in 250.64(A) through (F).

(A) Aluminum or Copper-Clad Aluminum Conductors. Grounding electrode conductors of bare, covered, or insulated aluminum or copper-clad aluminum shall comply with the following:

(1) Bare or covered conductors without an extruded polymeric covering shall not be installed where subject to corrosive conditions or be installed in direct contact with concrete.

(2) Terminations made within outdoor enclosures that are listed and identified for the environment shall be permitted within 450 mm (18 in.) of the bottom of the enclosure.

(3) Aluminum or copper-clad aluminum conductors external to buildings or equipment enclosures shall not be terminated within 450 mm (18 in.) of the earth.

(B) Securing and Protection Against Physical Damage. Where exposed, a grounding electrode conductor or its enclosure shall be securely fastened to the surface on which it is carried. Grounding electrode conductors shall be permitted to be installed on or through framing members.

(1) Not Exposed to Physical Damage. A 6 AWG or larger copper or aluminum grounding electrode conductor not exposed to physical damage shall be permitted to be run along the surface of the building construction without metal covering or protection.

(2) Exposed to Physical Damage. A 6 AWG or larger copper or aluminum grounding electrode conductor exposed to physical damage shall be protected in rigid metal conduit (RMC), intermediate metal conduit (IMC), Schedule 80 rigid polyvinyl chloride conduit (PVC), reinforced thermosetting resin conduit Type XW (RTRC-XW), electrical metallic tubing (EMT), or cable armor.

(3) Physical Protection. Grounding electrode conductors will be considered to be not exposed to physical damage when the conductor(s) are:

(a) Buried more than 12 inches deep in the earth outside the building's footprint;

(b) Encased or covered by 2 inches of concrete or asphalt;

(c) Located inside the building footprint and protected by the building's structural elements or when inside and determined, by the inspector, not to be subject to physical damage; or

(d) Enclosed by a metal or nonmetallic raceway or enclosure. The raceway or enclosure must be approved to protect from severe physical damage if it is not protected by appropriate physical barriers from contact with vehicles, lawn mowers, and other equipment that might damage the conductor or enclosure.

Informational Note: WAC 296-46B-250(5) has been incorporated into this section.

(((~~3~~))) (4) Smaller Than 6 AWG. Grounding electrode conductors smaller than 6 AWG shall be protected in RMC, IMC, Schedule 80 PVC, RTRC-XW, EMT, or cable armor.

(((~~4~~))) (5) In Contact with the Earth. Grounding electrode conductors and grounding electrode bonding jumpers in contact with the earth shall not be required to comply with 300.5, but shall be buried or otherwise protected if subject to physical damage.

(C) Continuous. Except as provided in 250.30(A)(5) and (A)(6), 250.30(B)(1), and 250.68(C), grounding electrode conductor(s) shall be installed in one continuous length without a splice or joint. If necessary, splices or connections shall be made as permitted in (1) through (4):

(1) Splicing of the wire-type grounding electrode conductor shall be permitted only by irreversible compression-type connectors listed as grounding and bonding equipment or by the exothermic welding process.

(2) Sections of busbars shall be permitted to be connected together to form a grounding electrode conductor.

(3) Bolted, riveted, or welded connections of structural metal frames of buildings or structures.

(4) Threaded, welded, brazed, soldered or bolted-flange connections of metal water piping.

(D) Building or Structure with Multiple Disconnecting Means in Separate Enclosures. If a building or structure is supplied by a service or feeder with two or more disconnecting means in separate enclosures, the grounding electrode connections shall be made in accordance with 250.64(D)(1), 250.64(D)(2), or 250.64(D)(3).

(1) Common Grounding Electrode Conductor and Taps. A common grounding electrode conductor and grounding electrode conductor taps shall be installed. The common grounding electrode conductor shall be sized in accordance with 250.66, based on the sum of the circular mil area of the largest ungrounded conductor(s) of each set of conductors that supplies the disconnecting means. If the service-entrance conductors connect directly to the overhead service conductors, service drop, underground service conductors, or service lateral, the common grounding electrode conductor shall be sized in accordance with Table 250.66, note 1.

A grounding electrode conductor tap shall extend to the inside of each disconnecting means enclosure. The grounding electrode conductor taps shall be sized in accordance with 250.66 for the largest service-entrance or feeder conductor serving the individual enclosure. The tap conductors shall be connected to the common grounding electrode conductor by one of the following methods in such a manner that the common grounding electrode conductor remains without a splice or joint:

(1) Exothermic welding.

(2) Connectors listed as grounding and bonding equipment.

(3) Connections to an aluminum or copper busbar not less than 6 mm thick × 50 mm wide (1/4 in. thick × 2 in. wide) and of sufficient length to accommodate the number of terminations necessary for the installation. The busbar shall be securely fastened and shall be installed in an accessible location. Connections shall be made by a listed connector or by the exothermic welding process. If aluminum busbars are used, the installation shall comply with 250.64(A).

(2) Individual Grounding Electrode Conductors. A grounding electrode conductor shall be connected between the grounding electrode system and one or more of the following, as applicable:

(1) Grounded conductor in each service equipment disconnecting means enclosure

(2) Equipment grounding conductor installed with the feeder

(3) Supply-side bonding jumper

Each grounding electrode conductor shall be sized in accordance with 250.66 based on the service-entrance or feeder conductor(s) supplying the individual disconnecting means.

(3) Common Location. A grounding electrode conductor shall be connected in a wireway or other accessible enclosure on the supply side of the disconnecting means to one or more of the following, as applicable:

(1) Grounded service conductor(s)

(2) Equipment grounding conductor installed with the feeder

(3) Supply-side bonding jumper

The connection shall be made with exothermic welding or a connector listed as grounding and bonding equipment. The grounding electrode conductor shall be sized in accordance with 250.66 based on the service-entrance or feeder conductor(s) at the common location where the connection is made.

(E) Raceways and Enclosures for Grounding Electrode Conductors.

(1) General. Ferrous metal raceways, enclosures, and cable armor for grounding electrode conductors shall be electrically continuous from the point of attachment to cabinets or equipment to the grounding electrode and shall be securely fastened to the ground clamp or fitting. Ferrous metal raceways, enclosures, and cable armor shall be bonded at each end of the raceway or enclosure to the grounding electrode or grounding electrode conductor to create an electrically parallel path. Nonferrous metal raceways, enclosures, and cable armor shall not be required to be electrically continuous.

(2) Methods. Bonding shall be in compliance with 250.92(B) and ensured by one of the methods in 250.92(B)(2) through (B)(4).

(3) Size. The bonding jumper for a grounding electrode conductor(s), raceway(s), enclosure(s), or cable armor shall be the same size as, or larger than, the largest enclosed grounding electrode conductor.

(4) Wiring Methods. If a raceway is used as protection for a grounding electrode conductor, the installation shall comply with the requirements of the appropriate raceway article.

(F) Installation to Electrode(s). Grounding electrode conductor(s) and bonding jumpers interconnecting grounding electrodes shall be installed in accordance with (1), (2), or (3). The grounding electrode conductor shall be sized for the largest grounding electrode conductor required among all the electrodes connected to it.

(1) The grounding electrode conductor shall be permitted to be run to any convenient grounding electrode available in the grounding electrode system where the other electrode(s), if any, is connected by bonding jumpers that are installed in accordance with 250.53(C).

(2) Grounding electrode conductor(s) shall be permitted to be run to one or more grounding electrode(s) individually.

(3) Bonding jumper(s) from grounding electrode(s) shall be permitted to be connected to an aluminum or copper busbar not less than 6 mm thick × 50 mm wide (1/4 in. thick × 2 in wide.) and of sufficient length to accommodate the number of terminations necessary for the installation. The busbar shall be securely fastened and shall be installed in an accessible location. Connections shall be made by a listed connector or by the exothermic welding process. The grounding electrode conductor shall be permitted to be run to the busbar. Where aluminum busbars are used, the installation shall comply with 250.64(A).

250.90 General. Bonding shall be provided where necessary to ensure electrical continuity and the capacity to conduct safely any fault current likely to be imposed.

Exception No. 1: Metallic stubs or valves used in nonmetallic plumbing systems are not required to be bonded to the electrical system unless required by an electrical equipment manufacturer's instructions.

Exception No. 2: Hot and cold water plumbing lines are not required to be bonded together if, at the time of inspection, the inspector can determine the lines are mechanically and electrically joined by one or more metallic mixing valves.

Informational Note: WAC 296-46B-250.090(7) and (8), requirements regarding bonding in plumbing systems or lines, are incorporated herein as Exceptions.

250.92 Services.

(A) Bonding of Equipment for Services. The normally non–current-carrying metal parts of equipment indicated in 250.92(A)(1) and (A)(2) shall be bonded together.

(1) All raceways, utility raceways that are metallically connected to other service equipment, cable trays, cablebus framework, auxiliary gutters, or service cable armor or sheaths that enclose, contain, or support service conductors, except as permitted in 250.80

(2) All enclosures containing service conductors, including meter fittings, boxes, or the like, interposed in the service raceway or armor

(B) Method of Bonding at the Service. Bonding jumpers meeting the requirements of this article shall be used around impaired connections, such as reducing washers or oversized, concentric, or eccentric knockouts. Standard locknuts or bushings shall not be the only means for the bonding required by this section but shall be permitted to be installed to make a mechanical connection of the raceway(s).

Electrical continuity at service equipment, service raceways, and service conductor enclosures shall be ensured by one of the following methods:

(1) Bonding equipment to the grounded service conductor in a manner provided in 250.8.

Exception: Connection to the grounded service conductor shall not be used to bond service terminal boxes and current transformer enclosures.

Informational Note: This requirement is found in Chapter 6 of Requirements for Electric Service Connection as published by Seattle City Light.

(2) Connections using threaded couplings or listed threaded hubs on enclosures if made up wrench tight

(3) Threadless couplings and connectors if made up tight for metal raceways and metal-clad cables

(4) Other listed devices, such as bonding-type locknuts, bushings, or bushings with bonding jumpers

250.104 Bonding of Piping Systems and Exposed Structural Metal.

Δ **(A) Metal Water Piping.** The metal water piping system shall be bonded as required in 250.104(A)(1), (A)(2), or (A)(3).

(1) General. Metal water piping system(s) installed in or attached to a building or structure shall be bonded to any of the following:

(1) Service equipment enclosure

(2) Grounded conductor at the service

(3) Grounding electrode conductor, if of sufficient size

(4) One or more grounding electrodes used, if the grounding electrode conductor or bonding jumper to the grounding electrode is of sufficient size

The bonding jumper(s) shall be installed in accordance with 250.64(A), 250.64(B), and 250.64(E). The points of attachment of the bonding jumper(s) shall be accessible. The bonding jumper(s) shall be sized in accordance with Table 250.102(C)(1) except that it shall not be required to be larger than 3/0 copper or 250 kcmil aluminum or copper-clad aluminum and except as permitted in 250.104(A)(2) and 250.104(A)(3).

(2) Buildings of Multiple Occupancy. In buildings of multiple occupancy where the metal water piping system(s) installed in or attached to a building or structure for the individual occupancies is metallically isolated from all other occupancies by use of nonmetallic water piping, the metal water piping system(s) for each occupancy shall be permitted to be bonded to the equipment grounding terminal of the switchgear, switchboard, or panelboard enclosure (other than service equipment) supplying that occupancy. The bonding jumper shall be sized in accordance with 250.102(D).

Δ **(3) Buildings or Structures Supplied by a Feeder(s) or Branch Circuit(s).** The metal water piping system(s) installed in or attached to a building or structure shall be bonded to any of the following:

(1) Building or structure disconnecting means enclosure where located at the building or structure

(2) Equipment grounding conductor run with the supply conductors

(3) One or more grounding electrodes used

(4) The bonding jumper(s) shall be sized in accordance with 250.102(D). The bonding jumper shall not be required to be larger than the largest ungrounded feeder or branch-circuit conductor supplying the building or structure.

Δ **(B) Other Metal Piping.** If installed in or attached to a building or structure, a metal piping system(s), including gas piping, that is likely to become energized shall be bonded to any of the following:

(1) Equipment grounding conductor for the circuit that is likely to energize the piping system

(2) Service equipment enclosure

(3) Grounded conductor at the service

(4) Grounding electrode conductor, if of sufficient size

(5) One or more grounding electrodes used, if the grounding electrode conductor or bonding jumper to the grounding electrode is of sufficient size

The bonding conductor(s) or jumper(s) shall be sized in accordance with Table 250.122, and equipment grounding conductors shall be sized in accordance with Table 250.122 using the rating of the circuit that is likely to energize the piping system(s). The points of attachment of the bonding jumper(s) shall be accessible.

Exception: Flexible gas piping shall be bonded to the grounding electrode system at any accessible location at the point where the flexible piping receives its supply. The bonding conductor connection shall not terminate on the flexible gas piping. The minimum size bonding conductor shall be No. 6 AWG copper or as required by the manufacturer's installation instructions.

Informational Note No. 1: Bonding all piping and metal air ducts within the premises will provide additional safety.

Informational Note No. 2: Additional information for gas piping systems can be found in NFPA 54-2018, *National Fuel Gas Code*, and NFPA 780-2017, *Standard for the Installation of Lightning Protection Systems*.

(C) Structural Metal. Exposed structural metal that is interconnected to form a metal building frame, is not intentionally grounded or bonded, and is likely to become energized shall be bonded to any of the following:

(1) Service equipment enclosure

(2) Grounded conductor at the service

(3) Disconnecting means for buildings or structures supplied by a feeder or branch circuit

(4) Grounding electrode conductor, if of sufficient size

(5) One or more grounding electrodes used, if the grounding electrode conductor or bonding jumper to the grounding electrode is of sufficient size

The bonding conductor(s) or jumper(s) shall be sized in accordance with Table 250.102(C)(1), except that it shall not be required to be larger than 3/0 copper or 250 kcmil aluminum or copper-clad aluminum, and installed in accordance with 250.64(A), 250.64(B), and 250.64(E). The points of attachment of the bonding jumper(s) shall be accessible unless installed in compliance with 250.68(A) Exception No. 2.

(D) Separately Derived Systems. Metal water piping systems and structural metal that is interconnected to form a building frame shall be bonded to separately derived systems in accordance with 250.104(D)(1) through 250.104(D)(3).

(1) Metal Water Piping System(s). The grounded conductor of each separately derived system shall be bonded to the nearest available point of the metal water piping system(s) in the area served by each separately derived system. This connection shall be made at the same point on the separately derived system where the grounding electrode conductor is connected. Each bonding jumper shall be sized in accordance with Table 250.102(C)(1) based on the largest ungrounded conductor of the separately derived system except that it shall not be required to be larger than 3/0 copper or 250 kcmil aluminum or copper-clad aluminum.

Exception No. 1: A separate bonding jumper to the metal water piping system shall not be required if the metal water piping system is used as the grounding electrode for the separately derived system and the water piping system is in the area served.

Exception No. 2: A separate water piping bonding jumper shall not be required if the metal frame of a building or structure is used as the grounding electrode for a separately derived system and is bonded to the metal water piping in the area served by the separately derived system.

(2) Structural Metal. If exposed structural metal that is interconnected to form the building frame exists in the area served by the separately derived system, it shall be bonded to the grounded conductor of each separately derived system. This connection shall be made at the same point on the separately derived system where the grounding electrode conductor is connected. Each bonding jumper shall be sized in accordance with Table 250.102(C)(1) based on the largest ungrounded conductor of the separately derived system except that it shall not be required to be larger than 3/0 copper or 250 kcmil aluminum or copper-clad aluminum.

Exception No. 1: A separate bonding jumper to the building structural metal shall not be required if the metal frame of a building or structure is used as the grounding electrode for the separately derived system.

Exception No. 2: A separate bonding jumper to the building structural metal shall not be required if the water piping of a building or structure is used as the grounding electrode for a separately derived system and is bonded to the building structural metal in the area served by the separately derived system.

(3) Common Grounding Electrode Conductor. If a common grounding electrode conductor is installed for multiple separately derived systems as permitted by 250.30(A)(6), and exposed structural metal that is interconnected to form the building frame or interior metal piping exists in the area served by the separately derived system, the metal piping and the structural metal member shall be bonded to the common grounding electrode conductor in the area served by the separately derived system.

Exception: A separate bonding jumper from each derived system to metal water piping and to structural metal members shall not be required if the metal water piping and the structural metal members in the area served by the separately derived system are bonded to the common grounding electrode conductor.

(E) Water system requirements. It is unlawful to connect to or use any water main or water pipe belonging to Seattle Public Utilities distribution and transmission systems for electrical grounding purposes.

Δ **250.118 Types of Equipment Grounding Conductors.** The equipment grounding conductor run with or enclosing the circuit conductors shall be one or more or a combination of the following:

(1) A copper, aluminum, or copper-clad aluminum conductor. This conductor shall be solid or stranded; insulated, covered, or bare; and in the form of a wire or a busbar of any shape.

(2) Rigid metal conduit.

(3) Intermediate metal conduit.

(4) Electrical metallic tubing except in wet locations.

(5) Listed flexible metal conduit meeting all the following conditions:

a. The conduit is terminated in listed fittings.

b. The circuit conductors contained in the conduit are protected by overcurrent devices rated at 20 amperes or less.

c. The size of the conduit does not exceed metric designator 35 (trade size 1 1/4).

d. The combined length of flexible metal conduit, flexible metallic tubing, and liquidtight flexible metal conduit in the same effective ground-fault current path does not exceed 1.8 m (6 ft).

e. If used to connect equipment where flexibility is necessary to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement after installation, a wire-type equipment grounding conductor shall be installed.

(6) Listed liquidtight flexible metal conduit meeting all the following conditions:

a. The conduit is terminated in listed fittings.

b. For metric designators 12 through 16 (trade sizes 3/8 through 1/2), the circuit conductors contained in the conduit are protected by overcurrent devices rated at 20 amperes or less.

c. For metric designators 21 through 35 (trade sizes 3/4 through 11/4), the circuit conductors contained in the conduit are protected by overcurrent devices rated not more than 60 amperes and there is no flexible metal conduit, flexible metallic tubing, or liquidtight flexible metal conduit in metric designators 12 through 16 (trade sizes 3/8 through 1/2) in the effective ground-fault current path.

d. The combined length of flexible metal conduit, flexible metallic tubing, and liquidtight flexible metal conduit in the same effective ground-fault current path does not exceed 1.8 m (6 ft).

e. If used to connect equipment where flexibility is necessary to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement after installation, a wire-type equipment grounding conductor shall be installed.

(7) Flexible metallic tubing where the tubing is terminated in listed fittings and meeting the following conditions:

a. The circuit conductors contained in the tubing are protected by overcurrent devices rated at 20 amperes or less.

b. The combined length of flexible metal conduit, flexible metallic tubing, and liquidtight flexible metal conduit in the same effective ground-fault current path does not exceed 1.8 m (6 ft).

(8) Armor of Type AC cable as provided in 320.108.

(9) The copper sheath of mineral-insulated, metal-sheathed cable Type MI.

(10) Type MC cable that provides an effective ground-fault current path in accordance with one or more of the following:

a. It contains an insulated or uninsulated equipment grounding conductor in compliance with 250.118(1).

b. The combined metallic sheath and uninsulated equipment grounding/bonding conductor of interlocked metal tape–type MC cable that is listed and identified as an equipment grounding conductor

c. The metallic sheath or the combined metallic sheath and equipment grounding conductors of the smooth or corrugated tube-type MC cable that is listed and identified as an equipment grounding conductor

(11) Cable trays as permitted in 392.10 and 392.60.

(12) Cablebus framework as permitted in 370.60(1).

(13) Other listed electrically continuous metal raceways and listed auxiliary gutters.

(14) Surface metal raceways listed for grounding.

Informational Note: For a definition of *effective ground-fault current path*, see Article 100

250.184 Solidly Grounded Neutral Systems. Solidly grounded neutral systems shall be permitted to be either single point grounded or multigrounded neutral.

(A) Neutral Conductor.

(1) Insulation Level. The minimum insulation level for neutral conductors of solidly grounded systems shall be 600 volts.

Exception No. 1: For multigrounded neutral systems as permitted in 250.184(C), bare copper conductors shall be permitted to be used for the neutral conductor of the following:
(1) Service-entrance conductors
(2) Service laterals or underground service conductors
(3) Direct-buried portions of feeders

Exception No. 2: Bare conductors shall be permitted for the neutral conductor of overhead portions installed outdoors.

Exception No. 3: The grounded neutral conductor shall be permitted to be a bare conductor if isolated from phase conductors and protected from physical damage.

Informational Note: See 225.4 for conductor covering where within 3.0 m (10 ft) of any building or other structure.

(2) Ampacity. The neutral conductor shall be of sufficient ampacity for the load imposed on the conductor but not less than 33 1/3 percent of the ampacity of the phase conductors.

Exception: In industrial and commercial premises under engineering supervision, it shall be permissible to size the ampacity of the neutral conductor to not less than 20 percent of the ampacity of the phase conductor.

(3) Existing installations. In addition to the requirements of NEC 250.184(A), the use of a concentric shield as a neutral conductor for extension, replacement, or repair in existing installations is permitted, if all of the following are complied with:

(a) The existing system uses the concentric shield as a neutral conductor;

(b) Each individual conductor contains a separate concentric shield sized to no less than thirty-three and one-third percent of the ampacity of the phase conductor for three phase systems or one hundred percent of the ampacity of the phase conductor for single-phase systems;

(c) The new or replacement cable's concentric shield is enclosed inside an outer insulating jacket; and

(d) The existing cable (i.e., existing cable installed directly in the circuit between the work and the circuit's overcurrent device) successfully passes the following tests:

i. Cable maintenance high potential dielectric test. The test must be performed in accordance with the cable manufacturer's instruction or the most recently published ANSI/NETA maintenance test specifications; and

ii. Resistance test of the cable shield. Resistance must be based on the type, size, and length of the conductor used as the cable shield using the conductor properties described in NEC Table 8 Conductor Properties.

An electrical engineer must provide a specific certification to the electrical plan review supervisor in writing that the test results of the maintenance high potential dielectric test and the resistance test have been reviewed by the electrical engineer and that the cable shield is appropriate for the installation. The electrical engineer must stamp the certification document with the engineer's stamp and signature. The document must be in the form of a letter or electrical plans.

Testing results are valid for a period of seven years from the date of testing. Cable must not be required to be tested at a shorter interval.

Informational Note: WAC 296-46B-250 (10) has been incorporated into this section.

(B) Single-Point Grounded Neutral System. Where a single-point grounded neutral system is used, the following shall apply:

(1) A single-point grounded neutral system shall be permitted to be supplied from (a) or (b):

a. A separately derived system

b. A multigrounded neutral system with an equipment grounding conductor connected to the multigrounded neutral conductor at the source of the single-point grounded neutral system

(2) A grounding electrode shall be provided for the system.

(3) A grounding electrode conductor shall connect the grounding electrode to the system neutral conductor.

(4) A bonding jumper shall connect the equipment grounding conductor to the grounding electrode conductor.

(5) An equipment grounding conductor shall be provided to each building, structure, and equipment enclosure.

(6) A neutral conductor shall only be required where phase-to-neutral loads are supplied.

(7) The neutral conductor, where provided, shall be insulated and isolated from earth except at one location.

(8) An equipment grounding conductor shall be run with the phase conductors and shall comply with (a), (b), and (c):

a. Shall not carry continuous load

b. May be bare or insulated

c. Shall have sufficient ampacity for fault current duty

(C) Multigrounded Neutral Systems. Where a multigrounded neutral system is used, the following shall apply:

(1) The neutral conductor of a solidly grounded neutral system shall be permitted to be grounded at more than one point. Grounding shall be permitted at one or more of the following locations:

a. Transformers supplying conductors to a building or other structure

b. Underground circuits where the neutral conductor is exposed

c. Overhead circuits installed outdoors

(2) The multigrounded neutral conductor shall be grounded at each transformer and at other additional locations by connection to a grounding electrode.

(3) At least one grounding electrode shall be installed and connected to the multigrounded neutral conductor every 400 m (1300 ft).

(4) The maximum distance between any two adjacent electrodes shall not be more than 400 m (1300 ft).

(5) In a multigrounded shielded cable system, the shielding shall be grounded at each cable joint that is exposed to personnel contact.

Exception: In a multipoint grounded system, a grounding electrode shall not be required to bond the neutral conductor in an uninterrupted conductor exceeding 400 m (1300 ft) if the only purpose for removing the cable jacket is for bonding the neutral conductor to a grounding electrode.

ARTICLE 300
General Requirements for Wiring Methods and Materials

300.1 Scope.

(A) All Wiring Installations. This article covers general requirements for wiring methods and materials for all wiring installations unless modified by other articles in Chapter 3.

Wiring methods in educational or institutional facilities as defined in this chapter must be metallic or nonmetallic raceways, MI, MC, or AC cable. Places of assembly located within these facilities must comply with NEC 518.4(A).

Exception: Assisted living facility generator systems may be wired and installed in accordance with Article 517, Health Care Facilities, of this Code.

Informational Note: WAC 296-46B-010(13), requirement for wiring method for assisted living facility generators, is incorporated herein with edits as an Exception.

(B) Integral Parts of Equipment. The provisions of this article are not intended to apply to the conductors that form an integral part of equipment, such as motors, controllers, motor control centers, or factory-assembled control equipment or listed utilization equipment.

(C) Metric Designators and Trade Sizes. Metric designators and trade sizes for conduit, tubing, and associated fittings and accessories shall be as designated in Table 300.1(C).

300.4 Protection Against Physical Damage. Where subject to physical damage, conductors, raceways, and cables shall be protected.

(A) Cables and Raceways Through Wood Members.

(1) Bored Holes. In both exposed and concealed locations, where a cable- or raceway-type wiring method is installed through bored holes in joists, rafters, or wood members, holes shall be bored so that the edge of the hole is not less than 32 mm (1 1/4 in.) from the nearest edge of the wood member. Where this distance cannot be maintained, the cable or raceway shall be protected from penetration by screws or nails by a steel plate(s) or bushing(s), at least 1.6 mm (1/16 in.) thick, and of appropriate length and width installed to cover the area of the wiring. Where installed in exterior walls, all wiring and device boxes must be a minimum of 63 mm (2 1/2 in.) from the exterior wall surface of the framing member.

Exception No. 1: Steel plates shall not be required to protect rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, or electrical metallic tubing.

Exception No. 2: A listed and marked steel plate less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail or screw penetration shall be permitted.

Exception No. 3: The installation of all structural elements and mechanical systems (e.g., framing, plumbing, ducting, etc.) must be complete in the area(s) where electrical inspection is requested. Prior to completion of an exterior wall cover inspection, either:
(a) The exterior shear panel or sheathing nail inspection must be completed by the building inspector; or
(b) All wiring and device boxes must be a minimum of 63 mm (2 1/2 in.) from the exterior surface of the framing member; or
(c) All wiring and device boxes must be protected by a steel plate a minimum of 1.6 mm (1/16 in.) thick of appropriate width and height installed to cover the area of the wiring or box.

Informational Note: WAC 296-46B-010(6), requirements for protecting wiring in walls, are incorporated herein as Exception 3.

(2) Notches in Wood. Where there is no objection because of weakening the building structure, in both exposed and concealed locations, cables or raceways shall be permitted to be laid in notches in wood studs, joists, rafters, or other wood members where the cable or raceway at those points is protected against nails or screws by a steel plate at least 1.6 mm (1/16 in.) thick, and of appropriate length and width, installed to cover the area of the wiring. The steel plate shall be installed before the building finish is applied.

Exception No. 1: Steel plates shall not be required to protect rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, or electrical metallic tubing.

Exception No. 2: A listed and marked steel plate less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail or screw penetration shall be permitted.

(B) Nonmetallic-Sheathed Cables and Electrical Nonmetallic Tubing Through Metal Framing Members.

(1) Nonmetallic-Sheathed Cable.

(a) In both exposed and concealed locations where nonmetallic-sheathed cables, operating at less than 120 volts nominal, pass through either factory- or field-punched, cut, or drilled slots or holes in metal members, the cable shall be protected by listed bushings or listed grommets covering all metal edges that are securely fastened in the opening prior to installation of the cable.

(b) Where nonmetallic-sheathed cables operate at 120 volts nominal or greater pass through either factory- or field-punched, cut, or drilled slots or holes in metal members, listed two-piece interlocking bushings or grommets shall be installed prior to passing the cable through such openings.

(2) Nonmetallic-Sheathed Cable and Electrical Nonmetallic Tubing. Where nails or screws are likely to penetrate nonmetallic-sheathed cable or electrical nonmetallic tubing, a steel sleeve, steel plate, or steel clip not less than 1.6 mm (1/16 in.) in thickness shall be used to protect the cable or tubing.

Exception: A listed and marked steel plate less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail or screw penetration shall be permitted.

(C) Cables Through Spaces Behind Panels Designed to Allow Access. Cables or raceway-type wiring methods, installed behind panels designed to allow access, shall be supported according to their applicable articles.

(D) Cables and Raceways Parallel to Framing Members and Furring Strips. In both exposed and concealed locations, where a cable- or raceway-type wiring method is installed parallel to framing members, such as joists, rafters, or studs, or is installed parallel to furring strips, the cable or raceway shall be installed and supported so that the nearest outside surface of the cable or raceway is not less than 32 mm (1 1/4 in.) from the nearest edge of the framing member or furring strips where nails or screws are likely to penetrate. Where this distance cannot be maintained, the cable or raceway shall be protected from penetration by nails or screws by a steel plate, sleeve, or equivalent at least 1.6 mm (1/16 in.) thick.

Exception No. 1: Steel plates, sleeves, or the equivalent shall not be required to protect rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, or electrical metallic tubing.

Exception No. 2: For concealed work in finished buildings, or finished panels for prefabricated buildings where such supporting is impracticable, it shall be permissible to fish the cables between access points.

Exception No. 3: A listed and marked steel plate less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail or screw penetration shall be permitted.

(E) Cables, Raceways, or Boxes Installed in or Under Roof Decking. A cable, raceway, or box, installed in exposed or concealed locations under metal-corrugated sheet roof decking, shall be installed and supported so there is not less than 38 mm (1 1/2 in.) measured from the lowest surface of the roof decking to the top of the cable, raceway, or box. A cable, raceway, or box shall not be installed in concealed locations in metal-corrugated, sheet decking–type roof.

Informational Note: Roof decking material is often repaired or replaced after the initial raceway or cabling and roofing installation and may be penetrated by the screws or other mechanical devices designed to provide "hold down" strength of the waterproof membrane or roof insulating material.

Exception: Rigid metal conduit and intermediate metal conduit shall not be required to comply with 300.4(E).

(F) Cables and Raceways Installed in Shallow Grooves. Cable- or raceway-type wiring methods installed in a groove, to be covered by wallboard, siding, paneling, carpeting, or similar finish, shall be protected by 1.6 mm (1/16 in.) thick steel plate, sleeve, or equivalent or by not less than 32-mm (1 1/4-in.) free space for the full length of the groove in which the cable or raceway is installed.

Exception No. 1: Steel plates, sleeves, or the equivalent shall not be required to protect rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, or electrical metallic tubing.

Exception No. 2: A listed and marked steel plate less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail or screw penetration shall be permitted.

Δ **(G) Fittings.** Where raceways contain 4 AWG or larger insulated circuit conductors, and these conductors enter a cabinet, a box, an enclosure, or a raceway, the conductors shall be protected in accordance with any of the following:

(1) An identified fitting providing a smoothly rounded insulating surface

(2) A listed metal fitting that has smoothly rounded edges

(3) Separation from the fitting or raceway using an identified insulating material that is securely fastened in place

(4) Threaded hubs or bosses that are an integral part of a cabinet, box, enclosure, or raceway providing a smoothly rounded or flared entry for conductors

Conduit bushings constructed wholly of insulating material shall not be used to secure a fitting or raceway. The insulating fitting or insulating material shall have a temperature rating not less than the insulation temperature rating of the installed conductors.

(H) Structural Joints. A listed expansion/deflection fitting or other approved means shall be used where a raceway crosses a structural joint intended for expansion, contraction or deflection, used in buildings, bridges, parking garages, or other structures.

300.11 Securing and Supporting.

(A) Secured in Place. Raceways, cable assemblies, boxes, cabinets, and fittings shall be securely fastened in place.

(B) Wiring Systems Installed Above Suspended Ceilings. Support wires that do not provide secure support shall not be permitted as the sole support. Support wires and associated fittings that provide secure support and that are installed in addition to the ceiling grid support wires shall be permitted as the sole support. Where independent support wires are used, they shall be secured at both ends. Cables and raceways shall not be supported by ceiling grids.

Δ **(1) Fire-Rated Assemblies.** Wiring located within the cavity of a fire-rated floor–ceiling or roof–ceiling assembly shall not be secured to, or supported by, the ceiling assembly, including the ceiling support wires. An independent means of secure support shall be provided and shall be permitted to be attached to the assembly. Where independent support wires are used, they shall be distinguishable by color, tagging, or other effective means from those that are part of the fire-rated design.

Exception: The ceiling support system shall be permitted to support wiring and equipment that have been tested as part of the fire-rated assembly.

Informational Note: One method of determining fire rating is testing in accordance with ANSI/ASTM E119-18b, *Standard Test Methods for Fire Tests of Building Construction and Materials*.

(2) Non–Fire-Rated Assemblies. Wiring located within the cavity of a non–fire-rated floor–ceiling or roof–ceiling assembly shall not be secured to, or supported by, the ceiling assembly, including the ceiling support wires. An independent means of secure support shall be provided and shall be permitted to be attached to the assembly. Where independent support wires are used, they shall be distinguishable by color, tagging, or other effective means.

Exception: The ceiling support system shall be permitted to support branch-circuit wiring and associated equipment where installed in accordance with the ceiling system manufacturer's instructions.

(3) Suspended Ceilings.

(a) NEC power limited, Class 2, and Class 3 cables must be secured in compliance with section 334.30 and must be secured to boxes in compliance with section 314.17 of this *Code*.

(b) Telecommunications cables must be secured in a manner that will not cause damage to the cables and at intervals not exceeding five feet. Cables are considered adequately supported when run through holes in building structural elements or other supporting elements. Telecommunications cables may be fished into inaccessible hollow spaces of finished buildings. Clamps or fittings are not required where telecommunications cables enter boxes.

(c) Optical fiber cables must be secured in a manner that will not cause damage to the cables and at intervals not exceeding five feet. Cables are considered adequately supported when run through holes in building structural elements or other supporting elements. Optical fiber cables may be fished into inaccessible hollow spaces of finished buildings. Supports must allow a bending radius that will not cause damage to the cables.

(d) Where not restricted by the building code official or Article 300 of this *Code*, the wires required in Section 300.11(A) of this *Code* may support raceways, cables, or boxes under the following conditions:

(1) Raceways or cables are not larger than three-quarter-inch trade size;

(2) No more than two raceways or cables are supported by a support wire. The two-cable limitation does not apply to telecommunications cables, Class 2 cables, or Class 3 cables on support wires installed exclusively for such cables. The support wire must be adequate to carry the cable(s) weight and all attached cables must be secured with approved fittings; or

(3) Raceways and cables are secured to the support wires by fittings designed and manufactured for the purpose.

In addition to (1), (2), and (3) of this subsection, the following conditions must be complied with:

(4) The support wires are minimum #12 AWG and are securely fastened to the structural ceiling and to the ceiling grid system; and

(5) The raceways or cables serve equipment that is located within the ceiling cavity or is mounted on or supported by the ceiling grid system. Telecommunications cables, Class 2 cables, or Class 3 cables supported as required by this section, may pass through ceiling cavities without serving equipment mounted on or supported by the ceiling grid system.

Informational Note: WAC 296-46B-300.011 requirements for support of raceways, cables, or boxes in suspended ceilings is incorporated herein.

(C) Raceways Used as Means of Support. Raceways shall be used only as a means of support for other raceways, cables, or nonelectrical equipment under any of the following conditions:

(1) Where the raceway or means of support is identified as a means of support

(2) Where the raceway contains power supply conductors for electrically controlled equipment and is used to support Class 2 circuit conductors or cables that are solely for the purpose of connection to the equipment control circuits

(3) Where the raceway is used to support boxes or conduit bodies in accordance with 314.23 or to support luminaires in accordance with 410.36(E)

(D) Cables Not Used as Means of Support. Cable wiring methods shall not be used as a means of support for other cables, raceways, or nonelectrical equipment.

300.15 Boxes, Conduit Bodies, or Fittings—Where Required. A box shall be installed at each outlet and switch point of concealed knob-and-tube wiring.

Fittings and connectors shall be used only with the specific wiring methods for which they are designed and listed.

Where the wiring method is conduit, tubing, Type AC cable, Type MC cable, Type MI cable, nonmetallic-sheathed cable, or other cables, a box or conduit body shall be installed at each conductor splice point, outlet point, switch point, junction point, termination point, or pull point, unless otherwise permitted in 300.15(A) through (L).

(A) Wiring Methods with Interior Access. A box or conduit body shall not be required for each splice, junction, switch, pull, termination, or outlet points in wiring methods with removable covers, such as wireways, multioutlet assemblies, auxiliary gutters, and surface raceways. The covers shall be accessible after installation.

(B) Equipment. An integral junction box or wiring compartment as part of approved equipment shall be permitted in lieu of a box.

(C) Protection. A box or conduit body shall not be required where cables enter or exit from conduit or tubing that is used to provide cable support or protection against physical damage. A fitting shall be provided on the end(s) of the conduit or tubing to protect the cable from abrasion.

(D) Type MI Cable. A box or conduit body shall not be required where accessible fittings are used for straight-through splices in mineral-insulated metal-sheathed cable.

((~~(E) Integral Enclosure.~~ ~~A wiring device with integral enclosure identified for the use, having brackets that securely fasten the device to walls or ceilings of conventional onsite frame construction, for use with nonmetallic-sheathed cable, shall be permitted in lieu of a box or conduit body.~~))

(E) Reserved.

Informational Note: See 334.30(C); 545.10; 550.15(I); 551.47(E), Exception No. 1; and 552.48(E), Exception No. 1.

(F) Fitting. A fitting identified for the use shall be permitted in lieu of a box or conduit body where conductors are not spliced or terminated within the fitting. The fitting shall be accessible after installation, unless listed for concealed installation.

(G) Direct-Buried Conductors. As permitted in 300.5(E), a box or conduit body shall not be required for splices and taps in direct-buried conductors and cables.

(H) Insulated Devices. As permitted in 334.40(B), a box or conduit body shall not be required for insulated devices supplied by nonmetallic-sheathed cable.

(I) Enclosures. A box or conduit body shall not be required where a splice, switch, terminal, or pull point is in a cabinet or cutout box, in an enclosure for a switch or overcurrent device as permitted in 312.8, in a motor controller as permitted in 430.10(A), or in a motor control center.

(J) Luminaires. A box or conduit body shall not be required where a luminaire is used as a raceway as permitted in 410.64.

(K) Embedded. A box or conduit body shall not be required for splices where conductors are embedded as permitted in 424.40, 424.41(D), 426.22(B), 426.24(A), and 427.19(A).

(L) Manholes and Handhole Enclosures. A box or conduit body shall not be required for conductors in manholes or handhole enclosures, except where connecting to electrical equipment. The installation shall comply with the provisions of Part V of Article 110 for manholes, and 314.30 for handhole enclosures.

300.19 Supporting Conductors and Cable Assemblies in Vertical ((~~Raceways~~)) Installations.

(A) Spacing Intervals—Maximum. Conductors and cables in vertical ((~~raceways~~)) installations shall be supported if the vertical rise exceeds the values in Table 300.19(A). At least one support method shall be provided for each conductor at the top of the vertical ((~~raceway~~)) installation or as close to the top as practical. Intermediate supports shall be provided as necessary to limit supported ((~~conductor~~)) lengths to not greater than those values specified in Table 300.19(A).

Exception: Steel wire armor cable shall be supported at the top of the riser with a cable support that clamps the steel wire armor. A safety device shall be permitted at the lower end of the riser to hold the cable in the event there is slippage of the cable in the wire-armored cable support. Additional wedge-type supports shall be permitted to relieve the strain on the equipment terminals caused by expansion of the cable under load.

(B) Fire-Rated Cables and Conductors. Support methods and spacing intervals for fire-rated cables and conductors shall comply with any restrictions provided in the listing of the electrical circuit protective system used and in no case shall exceed the values in Table 300.19(A).

Δ **(C) Support Methods.** One of the following methods of support shall be used:

(1) Clamping devices constructed of or employing insulating wedges inserted in the ends of the raceways. Where clamping of insulation does not adequately support the cable, the conductor also shall be clamped.

(2) Inserting boxes at the required intervals in which insulating supports are installed and secured in an approved manner to withstand the weight of the conductors attached thereto, the boxes being provided with covers.

(3) In junction boxes, deflecting the cables not less than 90 degrees and carrying them horizontally to a distance not less than twice the diameter of the cable, the cables being carried on two or more insulating supports and additionally secured thereto by tie wires, if desired. Where this method is used, cables shall be supported at intervals not greater than 20 percent of the support spacing in Table 300.19(A).

(4) Other approved means.

300.21 Spread of Fire or Products of Combustion. Electrical installations in hollow spaces, vertical shafts, and ventilation or air-handling ducts shall be made so that the possible spread of fire or products of combustion will not be substantially increased. Openings around electrical penetrations into or through fire-resistant-rated walls, partitions,

floors, or ceilings shall be firestopped using approved methods to maintain the fire resistance rating. All out-of-service cable shall be removed from accessible ceiling spaces.

Informational Note No. 1: Directories of electrical construction materials published by qualified testing laboratories contain many listing installation restrictions necessary to maintain the fire-resistive rating of assemblies where penetrations or openings are made. Building codes also contain restrictions on membrane penetrations on opposite sides of a fire-resistance-rated wall assembly. An example is the 600-mm (24-in.) minimum horizontal separation that usually applies between boxes installed on opposite sides of the wall. Assistance in complying with 300.21 can be found in building codes, fire resistance directories, and product listings.

Informational Note No. 2: See also Chapter 9 of the Seattle Building Code for fire protection systems and protection of penetrations of those systems.

ARTICLE 314
Outlet, Device, Pull, and Junction Boxes; Conduit Bodies; Fittings; and Handhole Enclosures

314.1 Scope. This article covers the installation and use of all boxes and conduit bodies used as outlet, device, junction, or pull boxes, depending on their use, and handhole enclosures. Cast metal, sheet metal, nonmetallic, and other boxes such as FS, FD, and larger boxes are not classified as conduit bodies. This article also includes installation requirements for fittings used to join raceways and to connect raceways and cables to boxes and conduit bodies.

Informational Note: See Chapter 12 of the *Seattle Building Code* and Chapter 3 of the *Seattle Residential Code* for location of outlet boxes in sound transmission control assemblies.

314.23 Supports. Enclosures within the scope of this article shall be supported in accordance with one or more of the provisions in 314.23(A) through (H).

(A) Surface Mounting. An enclosure mounted on a building or other surface shall be rigidly and securely fastened in place. If the surface does not provide rigid and secure support, additional support in accordance with other provisions of this section shall be provided.

(B) Structural Mounting. An enclosure supported from a structural member or from grade shall be rigidly supported either directly or by using a metal, polymeric, or wood brace.

(1) Nails and Screws. Nails and screws, where used as a fastening means, shall secure boxes by using brackets on the outside of the enclosure, or by using mounting holes in the back or in one or more sides of the enclosure, or they shall pass through the interior within 6 mm (1/4 in.) of the back or ends of the enclosure. Screws shall not be permitted to pass through the box unless exposed threads in the box are protected using approved means to avoid abrasion of conductor insulation. Mounting holes made in the field shall be approved.

(2) Braces. Metal braces shall be protected against corrosion and formed from metal that is not less than 0.51 mm (0.020 in.) thick uncoated. Wood braces shall have a cross section not less than nominal 25 mm × 50 mm (1 in. × 2 in.). Wood braces in wet locations shall be treated for the conditions. Polymeric braces shall be identified as being suitable for the use.

(C) Mounting in Finished Surfaces. An enclosure mounted in a finished surface shall be rigidly secured thereto by clamps, anchors, or fittings identified for the application.

(D) Suspended Ceilings. An enclosure mounted to structural or supporting elements of a suspended ceiling shall be not more than 1650 cm^3 (100 $in.^3$) in size and shall be securely fastened in place in accordance with either 314.23(D)(1) or (D)(2).

(1) Framing Members. An enclosure shall be fastened to the framing members by mechanical means such as bolts, screws, or rivets, or by the use of clips or other securing means identified for use with the type of ceiling framing member(s) and enclosure(s) employed. The framing members shall be supported in an approved manner and securely fastened to each other and to the building structure.

Δ **(2) Support Wires.** The installation shall comply with 300.11(A). The enclosure shall be secured, using identified methods, to ceiling support wire(s), including any additional support wire(s) installed for ceiling support. Support wire(s) used for enclosure support shall be fastened at each end so as to be taut within the ceiling cavity.

(E) Raceway-Supported Enclosure, Without Devices, Luminaires, or Lampholders. An enclosure that does not contain a device(s), other than splicing devices, or supports a luminaire(s), a lampholder, or other equipment and is supported by entering raceways shall not exceed 1650 cm^3 (100 $in.^3$) in size. It shall have threaded entries or identified hubs. It shall be supported by two or more conduits threaded wrenchtight into the enclosure or hubs. Each conduit shall be secured within 900 mm (3 ft) of the enclosure, or within 450 mm (18 in.) of the enclosure if all conduit entries are on the same side.

Exception: The following wiring methods shall be permitted to support a conduit body of any size, including a conduit body constructed with only one conduit entry, provided that the trade size of the conduit body is not larger than the largest trade size of the conduit or tubing:

(1) Intermediate metal conduit, Type IMC
(2) Rigid metal conduit, Type RMC
(3) Rigid polyvinyl chloride conduit, Type PVC
(4) Reinforced thermosetting resin conduit, Type RTRC
(5) Electrical metallic tubing, Type EMT

(F) Raceway-Supported Enclosures, with Devices, Luminaires, or Lampholders. An enclosure that contains a device(s), other than splicing devices, or supports a luminaire(s), a lampholder, or other equipment and is supported by entering raceways shall not exceed 1650 cm^3 (100 $in.^3$) in size. It shall have threaded entries or identified hubs. It shall be supported by two or more conduits threaded wrenchtight into the enclosure or hubs. Each conduit shall be secured within 450 mm (18 in.) of the enclosure.

Exception No. 1: Rigid metal or intermediate metal conduit shall be permitted to support a conduit body of any size, including a conduit body constructed with only one conduit entry, provided the trade size of the conduit body is not larger than the largest trade size of the conduit.

Exception No. 2: An unbroken length(s) of rigid or intermediate metal conduit shall be permitted to support a box used for luminaire or lampholder support, or to support a wiring enclosure that is an integral part of a luminaire and used in lieu of a box in accordance with 300.15(B), where all of the following conditions are met:

(1) The conduit is securely fastened at a point so that the length of conduit beyond the last point of conduit support does not exceed 900 mm (3 ft).
(2) The unbroken conduit length before the last point of conduit support is 300 mm (12 in.) or greater, and that portion of the conduit is securely fastened at some point not less than 300 mm (12 in.) from its last point of support.
(3) Where accessible to unqualified persons, the luminaire or lampholder, measured to its lowest point, is at least 2.5 m (8 ft) above grade or standing area and at least 900 mm (3 ft) measured horizontally to the 2.5 m (8 ft) elevation from windows, doors, porches, fire escapes, or similar locations.
(4) A luminaire supported by a single conduit does not exceed 300 mm (12 in.) in any direction from the point of conduit entry
(5) The weight supported by any single conduit does not exceed 9 kg (20 lb).
(6) At the luminaire or lampholder end, the conduit(s) is threaded wrenchtight into the box, conduit body, integral wiring enclosure, or identified hubs. Where a box or conduit body is used for support, the luminaire shall be secured directly to the box or conduit body, or through a threaded conduit nipple not over 75 mm (3 in.) long.

(G) Enclosures in Concrete or Masonry. An enclosure supported by embedment shall be identified as suitably protected from corrosion and securely embedded in concrete or masonry.

(H) Pendant Boxes. An enclosure supported by a pendant shall comply with 314.23(H)(1) or (H)(2).

(1) Flexible Cord. A box shall be supported from a multiconductor cord or cable in an approved manner that protects the conductors against strain, such as a strain-relief connector threaded into a box with a hub.

Flexible cord and cord connections must comply with 314.23(H) of this *Code* and the following:

(a) A suspended pendant box must not contain conduit "knockouts" and connection to a suspended box must utilize an integral threaded hub;

(b) The maximum length of the cord for a suspended pendant drop from a permanently installed junction box to a suitable tension take-up device above the pendant box must not exceed six feet;

(c) The flexible cord must be supported at each end with an approved cord grip or strain relief connector fitting/device that will eliminate all stress on the conductor connections;

(d) The flexible cord must be a minimum No. 14 AWG copper;

(e) The flexible cord ampacity must be determined using NEC Table 400.5(A) column A; and

(f) The flexible cord must be hard or extra hard usage.

Informational Note: WAC 296-46B-314-023(H), requirements for flexible cord connection of pendant boxes, is incorporated herein.

(2) Conduit. A box supporting lampholders or luminaires, or wiring enclosures within luminaires used in lieu of boxes in accordance with 300.15(B), shall be supported by rigid or intermediate metal conduit stems. For stems longer than 450 mm

(18 in.), the stems shall be connected to the wiring system with listed swivel hangers suitable for the location. At the luminaire end, the conduit(s) shall be threaded wrenchtight into the box, wiring enclosure, or identified hubs.

Where supported by only a single conduit, the threaded joints shall be prevented from loosening by the use of set-screws or other effective means, or the luminaire, at any point, shall be at least 2.5 m (8 ft) above grade or standing area and at least 900 mm (3 ft) measured horizontally to the 2.5 m (8 ft) elevation from windows, doors, porches, fire escapes, or similar locations. A luminaire supported by a single conduit shall not exceed 300 mm (12 in.) in any horizontal direction from the point of conduit entry.

ARTICLE 326
Integrated Gas Spacer Cable: Type IGS

326.10 Uses Permitted. Type IGS cable shall be permitted for use underground, including direct burial in the earth, as the following:

(1) ((~~Service-entrance conductors~~)) Reserved

(2) Feeder or branch-circuit conductors

(3) ((~~Service conductors, underground~~)) Reserved

ARTICLE 330
Metal-Clad Cable: Type MC

330.10 Uses Permitted.

(A) General Uses. Type MC cable shall be permitted as follows:

(1) For ((~~services,~~)) feeders ((~~,~~)) and branch circuits. Type MC cable may be used for services provided each of the following conditions are met:

a. Obtain prior approval of the authority having jurisdiction for the specific installation.

b. The metallic covering is impervious to moisture.

c. A lead sheath or moisture-impervious jacket is provided under the metal covering.

d. The insulated conductors under the metallic covering are listed for use in wet locations and a corrosion-resistant jacket is provided over the metallic sheath.

(2) For power, lighting, control, and signal circuits.

(3) Indoors or outdoors.

(4) Exposed or concealed.

(5) To be direct buried where identified for such use.

(6) In cable tray where identified for such use.

(7) In any raceway.

(8) As aerial cable on a messenger.

(9) In hazardous (classified) locations where specifically permitted by other articles in this *Code*.

(10) In dry locations and embedded in plaster finish on brick or other masonry except in damp or wet locations.

(11) In wet locations where a corrosion-resistant jacket is provided over the metallic covering and any of the following conditions are met:

a. The metallic covering is impervious to moisture.

b. A jacket resistant to moisture is provided under the metal covering.

c. The insulated conductors under the metallic covering are listed for use in wet locations.

(12) Where single-conductor cables are used, all phase conductors and, where used, the grounded conductor shall be grouped together to minimize induced voltage on the sheath.

(B) Specific Uses. Type MC cable shall be permitted to be installed in compliance with Parts II and III of Article 725 and 770.133 as applicable and in accordance with 330.10(B)(1) through (B)(4).

Informational Note: The "Uses Permitted" is not an all-inclusive list.

(1) Cable Tray. Type MC cable installed in cable tray shall comply with 392.10, 392.12, 392.18, 392.20, 392.22, 392.30, 392.46, 392.56, 392.60(C), and 392.80.

(2) Direct Buried. Direct-buried cable shall comply with 300.5 or 300.50, as appropriate.

(3) Installed as Service-Entrance Cable. Type MC cable installed as service-entrance cable shall be permitted in accordance with 230.43.

(4) Installed Outside of Buildings or Structures or as Aerial Cable. Type MC cable installed outside of buildings or structures or as aerial cable shall comply with 225.10, 396.10, and 396.12.

Informational Note: The "Uses Permitted" is not an all-inclusive list.

ARTICLE 334
Nonmetallic-Sheathed Cable: Types NM and NMC

Δ **334.10 Uses Permitted.** Type NM and Type NMC cables shall be permitted to be used in the following, except as prohibited in 334.12:

(1) One- and two-family dwellings and their attached or detached garages, and their storage buildings.

(2) Multi-family dwellings ((~~permitted to be~~)) of Types III, IV-HT, and V construction except as prohibited in 334.12. Cables shall be concealed within walls, floors, or ceilings that provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies.

(3) Other structures ((~~permitted to be~~)) of Types III, IV-HT, and V except as prohibited in 334.12 construction. Cables shall be concealed within walls, floors, or ceilings that provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies.

Informational Note ((~~No. 1~~)): Types of building construction and occupancy classifications ((~~are defined in NFPA 220-2018, *Standard on Types of Building Construction*, or the applicable building code, or both~~))the *Seattle Building Code*.

(~~Informational Note No. 2: See Informative Annex E for determination of building types. [NFPA 220, Table 4.1.1]~~))

(4) Cable trays in structures permitted to be Types III, IV-HT, or V where the cables are identified for the use.

Informational Note: See 310.14(A)(3) for temperature limitation of conductors.

(5) Types I and II construction where installed within raceways permitted to be installed in Types I and II construction.

(A) Type NM. Type NM cable shall be permitted as follows:

(1) For both exposed and concealed work in normally dry locations except as prohibited in 334.10(3)

(2) To be installed or fished in air voids in masonry block or tile walls

(B) Type NMC. Type NMC cable shall be permitted as follows:

(1) For ((~~both exposed and~~)) concealed work in dry, moist, damp, or corrosive locations, except as prohibited by 334.10(3)

(2) In outside and inside walls of masonry block or tile

(3) In a shallow chase in masonry, concrete, or adobe protected against nails or screws by a steel plate at least 1.59 mm (1/16 in.) thick and covered with plaster, adobe, or similar finish

334.12 Uses Not Permitted.

(A) Types NM and NMC. Types NM and NMC cables shall not be permitted as follows:

(1) In any dwelling or structure not specifically permitted in 334.10(1), (2), (3), and (5)

(2) Exposed within a dropped or suspended ceiling cavity in other than one- and two-family and multifamily dwellings

(3) As service-entrance cable

(4) In commercial garages having hazardous (classified) locations as defined in 511.3

(5) In theaters and similar locations, except where permitted in 518.4(B)

(6) In motion picture studios

(7) In storage battery rooms

(8) In hoistways or on elevators or escalators

(9) Embedded in poured cement, concrete, or aggregate

(10) In hazardous (classified) locations, except where specifically permitted by other articles in this *Code*

(B) Type NM. Type NM cables shall not be used under the following conditions or in the following locations:

(1) Where exposed to corrosive fumes or vapors

(2) Where embedded in masonry, concrete, adobe, fill, or plaster

(3) In a shallow chase in masonry, concrete, or adobe and covered with plaster, adobe, or similar finish

(4) In wet or damp locations

334.15 Exposed Work. In exposed work, except as provided in 300.11(A), cable shall be installed as specified in 334.15(B) through (C).

(((A) To Follow Surface. ~~Cable shall closely follow the surface of the building finish or of running boards.~~))

(A) Work Considered as Concealed. Nonmetallic-sheathed cable shall be considered as concealed where installed in inaccessible void areas of buildings or where run between or through bored holes of studs, joists and similar members as required in Section 300.4. All outlet, junction, or device boxes shall be installed as required for concealed work.

(B) Protection from Physical Damage. Cable shall be protected from physical damage where necessary by rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC conduit, Type RTRC marked with the suffix -XW, or other approved means. ((~~Where passing through a floor, the cable shall be enclosed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC conduit, Type RTRC marked with the suffix -XW, or other approved means extending at least 150 mm (6 in.) above the floor.~~))

Type NMC cable installed in shallow chases or grooves in masonry, concrete, or adobe, shall be protected in accordance with the requirements in 300.4(F) and covered with plaster, adobe, or similar finish.

Exception: Exposed nonmetallic-sheathed cable that is properly supported may enter the top section only of a surface-mounted main service panel where the distance from the top of the panel to the bottom of the ceiling joist above does not exceed 2 1/2 feet.

(C) In Unfinished Basements. ((~~and Crawl Spaces.~~)) Where cable is run at angles with joists in unfinished basements, ((~~and crawl spaces,~~)) it shall be ((~~permissible to secure cables not smaller than two 6 AWG or three 8 AWG conductors directly to the lower edges of the joists. Smaller cables shall be~~)) run ((~~either~~)) through bored holes in joists. ((~~or on running boards.~~)) Nonmetallic-sheathed cable installed on the wall of an unfinished basement shall be ((~~permitted to be~~)) installed in a listed conduit or tubing. ((~~or shall be protected in accordance with 300.4.~~)) Conduit or tubing shall be provided with a suitable insulating bushing or adapter at the point the cable enters the raceway. The sheath of the nonmetallic-sheathed cable shall extend through the conduit or tubing and into the outlet or device box not less than 6 mm (1/4 in.). The cable shall be secured within 300 mm (12 in.) of the point where the cable enters the conduit or tubing. Metal conduit, tubing, and metal outlet boxes shall be connected to an equipment grounding conductor complying with the provisions of 250.86 and 250.148.

(D) In Crawl Spaces. Where cable is run at angles with joists in crawl spaces, it shall be permissible to secure cables directly to the lower edges of the joists or through bored holes in the joists. For the purpose of this section, "crawl space" is defined as any unoccupied space of limited height, usually less than a full story but of sufficient height to permit workers access to otherwise concealed ductwork, piping, or wiring, and the space is usually enclosed by a foundation wall.

334.25 Out of service and abandoned conductors. All out-of-service cable and abandoned conductors shall be removed from accessible ceiling and wall spaces unless tagged and terminated at both ends in accordance with 300.15.

ARTICLE 336
Power and Control Cable: Type TC

Δ **336.10 Uses Permitted.** Type TC cable shall be permitted to be used as follows:

(1) For power, lighting, control, and signal circuits.

(2) In cable trays, including those with mechanically discontinuous segments up to 300 mm (1 ft).

(3) In raceways.

(4) In outdoor locations supported by a messenger wire.

(5) For Class 1 circuits as permitted in Parts II and III of Article 725.

(6) For non-power-limited fire alarm circuits if conductors comply with the requirements of 760.49.

(7) Between a cable tray and the utilization equipment or device(s), provided all of the following apply:

a. The cable is Type TC-ER.

b. The cable is installed in industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation.

c. The cable is continuously supported and protected against physical damage using mechanical protection such as struts, angles, or channels.

d. The cable complies with the crush and impact requirements of Type MC cable and is identified with the marking "TC–ER."

e. The cable is secured at intervals not exceeding 1.8 m (6 ft).

f. Equipment grounding for the utilization equipment is provided by an equipment grounding conductor within the cable. In cables containing conductors sized 6 AWG or smaller, the equipment grounding conductor shall be provided within the cable or, at the time of installation, one or more insulated conductors shall be permanently identified as an equipment grounding conductor in accordance with 250.119(B).

Exception to (7): Where not subject to physical damage, Type TC-ER shall be permitted to transition between cable trays and between cable trays and equipment or devices for a distance not to exceed 1.8 m (6 ft) without continuous support. The cable shall be mechanically supported where exiting the cable tray to ensure that the minimum bending radius is not exceeded

(8) Type TC cable shall be resistant to moisture and corrosive agents where installed in wet locations.

(9) In one- and two-family dwelling units, Type TC-ER-JP cable containing both power and control conductors shall be permitted for branch circuits and feeders. Type TC-ER-JP cable used as interior wiring shall be installed per the requirements of Part II of Article 334 and where installed as exterior wiring shall be installed per the requirements of Part II of Article 340.

Exception: Where used to connect a generator and associated equipment having terminals rated 75°C (140°F) or higher, the cable shall not be limited in ampacity by 334.80 or 340.80.

Informational Note: See 725.136 for limitations on Class 2 or 3 circuits contained within the same cable with conductors of electric light, power, or Class 1 circuits.

(10) Direct buried, where identified for such use.

(11) In hazardous (classified) locations where specifically permitted by other articles in this *Code*.

(12) In addition to the uses allowed in NEC 336.10, Type TC-ER-JP cable may be used in any location allowed for nonmetallic sheathed cable in NEC 334 if all the installation requirements in NEC 336 and 334 and WAC 296-46B-334 are met.

ARTICLE 338
Service Entrance Cables: Types SE and USE

338.10 Uses Permitted.

(A) ((~~Service-Entrance Conductors.~~ ~~Service-entrance cable shall be permitted to be used as service-entrance conductors and shall be installed in accordance with 230.6, 230.7, and Parts II, III, and IV of Article 230.~~)) **Reserved.**

(B) Branch Circuits or Feeders.

(1) Grounded Conductor Insulated. Type SE service-entrance cables shall be permitted in wiring systems where all of the circuit conductors of the cable are of the thermoset or thermoplastic type.

(2) Use of Uninsulated Conductor. Type SE service-entrance cable shall be permitted for use where the insulated conductors are used for circuit wiring and the uninsulated conductor is used only for equipment grounding purposes.

Exception: In existing installations, uninsulated conductors shall be permitted as a grounded conductor in accordance with 250.32 and 250.140 where the uninsulated grounded conductor of the cable originates in service equipment, and 225.30 through 225.40.

(3) Temperature Limitations. Type SE service-entrance cable used to supply appliances shall not be subject to conductor temperatures in excess of the temperature specified for the type of insulation involved.

Δ **(4) Installation Methods for Branch Circuits and Feeders.**

Informational Note No. 1: See 310.14(A)(3) for temperature limitation of conductors.

Informational Note No. 2: For the installation of main power feeder conductors in dwelling units refer to 310.12.

(a) Interior Installations.

(1) In addition to the provisions of this article, Type SE service-entrance cable used for interior wiring shall comply with the installation requirements of Part II of Article 334, excluding 334.80.

(2) Where more than two Type SE cables containing two or more current-carrying conductors in each cable are installed in contact with thermal insulation, caulk, or sealing foam without maintaining spacing between cables, the ampacity of each conductor shall be adjusted in accordance with Table 310.15(C)(1).

(3) For Type SE cable with ungrounded conductor sizes 10 AWG and smaller, where installed in contact with thermal insulation, the ampacity shall be in accordance with 60°C (140°F) conductor temperature rating. The maximum conductor temperature rating shall be permitted to be used for ampacity adjustment and correction purposes, if the final ampacity does not exceed that for a 60°C (140°F) rated conductor.

(b) Exterior Installations.

(1) In addition to the provisions of this article, service-entrance cable used for feeders or branch circuits, where installed as exterior wiring, shall be installed in accordance with Part I of Article 225. The cable shall be supported in accordance with 334.30.

(2) Type USE cable installed as underground feeder and branch circuit cable shall comply with Part II of Article 340.

Exception: Single-conductor Type USE and multi-rated USE conductors shall not be subject to the ampacity limitations of Part II of Article 340

338.12 Uses Not Permitted.

(A) Service-Entrance Cable. Service-entrance cable (SE) shall not be used under the following conditions or in the following locations:

(1) Where subject to physical damage unless protected in accordance with 230.50(B)

(2) Underground with or without a raceway

(3) For exterior branch circuits and feeder wiring unless the installation complies with the provisions of Part I of Article 225 and is supported in accordance with 334.30 or is used as messenger-supported wiring as permitted in Part II of Article 396

(4) As service entrance conductors

(B) Underground Service-Entrance Cable. Underground service-entrance cable (USE) shall not be used under the following conditions or in the following locations:

(1) For interior wiring

(2) For aboveground installations except where USE cable emerges from the ground and is terminated in an enclosure at an outdoor location and the cable is protected in accordance with 300.5(D)

(3) As aerial cable unless it is a multiconductor cable identified for use aboveground and installed as messenger-supported wiring in accordance with 225.10 and Part II of Article 396

(4) As service entrance conductors

338.25 Out of service and abandoned conductors. All out-of-service cable and abandoned conductors shall be removed from accessible ceiling and wall spaces unless tagged and terminated at both ends in accordance with 300.15.

ARTICLE 358
Electrical Metallic Tubing: Type EMT

358.10 Uses Permitted.

(A) Exposed and Concealed. The use of EMT shall be permitted for both exposed and concealed work for the following:

(1) In concrete ((~~,~~)) not in direct contact with the earth ((~~or in~~))

(2) In areas not subject to severe corrosive influences ((~~where installed in accordance with 358.10(B)~~

((~~(2)~~)) (3) In dry, damp, and wet locations

((~~(3)~~)) (4) In any hazardous (classified) location as permitted by other articles in this *Code*

(B) Corrosive Environments.

(1) Galvanized Steel and Stainless Steel EMT, Elbows, and Fittings. Galvanized steel and stainless steel EMT, elbows, and fittings shall be permitted to be installed in concrete ((~~,~~)) that is not in direct contact with the earth ((~~,~~)) or in areas not subject to severe corrosive influences where protected by corrosion protection and approved as suitable for the condition.

(2) Supplementary Protection of Aluminum EMT. Aluminum EMT shall be provided with approved supplementary corrosion protection where encased in concrete ((~~or~~)) when the concrete is not in direct contact with the earth.

~~**(((C) Cinder Fill.** Galvanized steel and stainless steel EMT shall be permitted to be installed in cinder concrete or cinder fill where subject to permanent moisture when protected on all sides by a layer of noncinder concrete at least 50 mm (2 in.) thick or when the tubing is installed at least 450 mm (18 in.) under the fill.~~

~~(D)~~)) (C) Wet Locations. All supports, bolts, straps, screws, and so forth shall be of corrosion-resistant materials or protected against corrosion by corrosion-resistant materials.

Circuits installed in EMT in wet locations shall use equipment grounding conductors sized in accordance with Section 250.122.

Informational Note: See 300.6 for protection against corrosion.

N **((~~(E)~~)) (D) Physical Damage.** Steel and stainless steel EMT shall be permitted to be installed where subject to physical damage.

358.12 Uses Not Permitted. EMT shall not be used under the following conditions:

((~~(1) Where subject to severe physical damage~~

~~(2) For the support of luminaires or other equipment except conduit bodies no larger than the largest trade size of the tubing~~))

(1) Where, during installation or afterward, it will be subject to severe physical damage.

(2) Where protected from corrosion solely by enamel.

(3) In cinder concrete or finder fill where subject to permanent moisture unless protected on all sides by a layer of noncinder concrete at least 50 mm (2 in.) thick or unless the tubing is at least 450 mm (18 in.) under the fill.

(4) In any hazardous (classified) location except as permitted by other articles in this *Code.*

(5) For the support of luminaires or other equipment except conduit bodies no larger than the largest trade size of tubing.

(6) Where practicable, dissimilar metals in contact anywhere in the system shall be avoided to eliminate the possibility of galvanic action.

(7) Where placed in concrete and the concrete is in direct contact with the earth.

Exception: Aluminum fittings and enclosures shall be permitted to be used in steel EMT where not subject to severe corrosive influences.

ARTICLE 382
Nonmetallic Extensions

Article 382 is not adopted.

((~~Part I. General~~

~~**382.1 Scope. This article covers the use, installation, and construction specifications for nonmetallic extensions.**~~

~~**382.2 Definitions. The definitions in this section shall apply within this article and throughout the *Code*.**~~

~~A **Concealable Nonmetallic Extension.** A listed assembly of two, three, or four insulated circuit conductors within a nonmetallic jacket, an extruded thermoplastic covering, or a sealed nonmetallic covering. The classification includes surface extensions intended for mounting directly on the surface of walls or ceilings and concealed with paint, texture, joint compound, plaster, wallpaper, tile, wall paneling, or other similar materials.~~

~~**Nonmetallic Extension.** An assembly of two insulated conductors within a nonmetallic jacket or an extruded thermoplastic covering. The classification includes surface extensions intended for mounting directly on the surface of walls or ceilings.~~

~~**382.6 Listing Requirements.** Concealable nonmetallic extensions and associated fittings and devices shall be listed. The starting/source tap device for the extension shall contain and provide the following protection for all load-side extensions and devices:~~

~~(1) Supplementary overcurrent protection~~

~~(2) Level of protection equivalent to a Class A GFCI~~

~~(3) Level of protection equivalent to a portable GFCI~~

~~(4) Line and load-side miswire protection~~

~~(5) Provide protection from the effects of arc faults~~

~~**Part II. Installation**~~

~~**382.10 Uses Permitted.** Nonmetallic extensions shall be permitted only in accordance with 382.10(A), (B), and (C).~~

~~**(A) From an Existing Outlet.** The extension shall be from an existing outlet on a 15- or 20-ampere branch circuit. Where a concealable nonmetallic extension originates from a non-grounding-type receptacle, the installation shall comply with 250.130(C), 406.4(D)(2)(b), or 406.4(D)(2)(c).~~

~~**(B) Exposed and in a Dry Location.** The extension shall be run exposed, or concealed as permitted in 382.15, and in a dry location.~~

~~**(C) Residential or Offices.** For nonmetallic surface extensions mounted directly on the surface of walls or ceilings, the building shall be occupied for residential or office purposes and shall not exceed three floors abovegrade. Where identified for the use, concealable nonmetallic extensions shall be permitted more than three floors abovegrade.~~

~~Informational Note No. 1: See 310.14(A)(3) for temperature limitation of conductors.~~

~~Informational Note No. 2: See 362.10 for definition of *First Floor*.~~

~~**382.12 Uses Not Permitted.** Nonmetallic extensions shall not be used as follows:~~

~~(1) In unfinished basements, attics, or roof spaces~~

~~(2) Where the voltage between conductors exceeds 150 volts for nonmetallic surface extensions and 300 volts for aerial cable~~

~~(3) Where subject to corrosive vapors~~

~~(4) Where run through a floor or partition, or outside the room in which it originates~~

~~**382.15 Exposed.**~~

~~**(A) Nonmetallic Extensions.** One or more extensions shall be permitted to be run in any direction from an existing outlet, but not on the floor or within 50 mm (2 in.) from the floor.~~

~~**(B) Concealable Nonmetallic Extensions.** Where identified for the use, nonmetallic extensions shall be permitted to be concealed with paint, texture, concealing compound, plaster, wallpaper, tile, wall paneling, or other similar materials and installed in accordance with 382.15(A).~~

~~**382.26 Bends.**~~

~~**(A) Nonmetallic Extensions.** A bend that reduces the normal spacing between the conductors shall be covered with a cap to protect the assembly from physical damage.~~

~~**(B) Concealable Nonmetallic Extensions.** Concealable extensions shall be permitted to be folded back over themselves and flattened as required for installation.~~

~~**382.30 Securing and Supporting.**~~

~~**(A) Nonmetallic Extensions.** Nonmetallic surface extensions shall be secured in place by approved means at intervals not exceeding 200 mm (8 in.), with an allowance for 300 mm (12 in.) to the first fastening where the connection to the supplying outlet is by means of an attachment plug. There shall be at least one fastening between each two adjacent outlets supplied. An extension shall be attached to only woodwork or plaster finish and shall not be in contact with any metal work or other conductive material other than with metal plates on receptacles.~~

~~**(B) Concealable Nonmetallic Extensions.** All surface-mounted concealable nonmetallic extension components shall be firmly anchored to the wall or ceiling using an adhesive or mechanical anchoring system identified for this use.~~

~~**382.40 Boxes and Fittings.** Each run shall terminate in a fitting, connector, or box that covers the end of the assembly. All fittings, connectors, and devices shall be of a type identified for the use.~~

~~**382.42 Devices.**~~

~~**(A) Receptacles.** All receptacles, receptacle housings, and self-contained devices used with concealable nonmetallic extensions shall be identified for this use.~~

~~**(B) Receptacles and Housings.** Receptacle housings and self-contained devices designed either for surface or for recessed mounting shall be permitted for use with concealable nonmetallic extensions. Receptacle housings and self-contained devices shall incorporate means for facilitating entry and termination of concealable nonmetallic extensions and for electrically connecting the housing or device. Receptacle and self-contained devices shall comply with 406.4. Power and communications outlets installed together in common housing shall be permitted in accordance with 805.133(A)(1)(c), Exception No. 2.~~

~~**382.56 Splices and Taps.** Extensions shall consist of a continuous unbroken length of the assembly, without splices, and without exposed conductors between fittings, connectors, or devices. Taps shall be permitted where approved fittings completely covering the tap connections are used. Aerial cable and its tap connectors shall be provided with an approved means for polarization. Receptacle-type tap connectors shall be of the locking type.~~

~~**382.100 Construction.** Concealable nonmetallic extensions shall be of a multilayer flat conductor design consisting of a center ungrounded conductor enclosed by a sectioned grounded conductor and an overall sectioned equipment grounding conductor.~~

~~**382.104 Flat Conductors.** Concealable nonmetallic extensions shall be constructed, using flat copper conductors equivalent to 14 AWG or 12 AWG conductor sizes, and constructed per 382.104(A), (B), and (C).~~

~~**(A) Ungrounded Conductor (Center Layer).** The ungrounded conductor shall consist of one or more ungrounded flat conductor(s) enclosed in accordance with 382.104(B) and (C) and identified in accordance with 310.6(C).~~

~~**(B) Grounded Conductor (Inner Sectioned Layers).** The grounded conductor shall consist of two sectioned inner flat conductors that enclose the center ungrounded conductor(s). The sectioned grounded conductor shall be enclosed by the sectioned equipment grounding conductor and identified in accordance with 200.6.~~

~~**(C) Equipment Grounding Conductor (Outer Sectioned Layers).** The equipment grounding conductor shall consist of two overall sectioned conductors that enclose the grounded conductor and ungrounded conductor(s) and shall comply with 250.4(A)(5). The equipment grounding conductor layers shall be identified by any one of the following methods:~~

~~(1) As permitted in 250.119~~

~~(2) A clear covering~~

~~(3) One or more continuous green stripes or hash marks~~

~~(4) The term "Equipment Grounding Conductor" printed at regular intervals throughout the cable~~

~~**382.112 Insulation.** The ungrounded and grounded flat conductor layers shall be individually insulated and comply with 310.14(A)(3). The equipment grounding conductor shall be covered or insulated.~~

~~**382.120 Marking.**~~

~~**(A) Cable.** Concealable nonmetallic extensions shall be clearly and durably marked on both sides at intervals of not more than 610 mm (24 in.) with the information required by 310.8(A) and with the following additional information:~~

~~(1) Material of conductors~~

~~(2) Maximum temperature rating~~

~~(3) Ampacity~~

~~**(B) Conductor Identification.** Conductors shall be clearly and durably identified on both sides throughout their length as specified in 382.104.~~))

ARTICLE 394
Concealed Knob-and-Tube Wiring

394.1 Scope. This article covers the use, installation, and construction specifications of concealed knob-and-tube wiring.

This article does not prohibit the installation of loose or rolled thermal insulating material in spaces containing existing knob-and-tube wiring provided that all the following conditions are met:

(1) The wiring must be surveyed by an appropriately licensed electrical contractor who must certify in writing to the department that the wiring is in good condition with no evidence of improper overcurrent protection, conductor insulation failure or deterioration, and with no improper connections or splices. The electrical inspector must inspect all repairs, alterations, or extensions to the electrical system.

(2) The insulation must meet Class I specifications as identified in the International Building Code, with a flame spread index of 25 or less as tested using ASTM E84 or UL 723. Foam insulation may not be used with knob-and-tube wiring.

(3) All knob-and-tube circuits must have overcurrent protection in compliance with NEC Table 310.16, 60 degrees centigrade, Column C. Overcurrent protection must be either circuit breakers or Type S fuses.

Informational Note: WAC 296-46B-394, requiring a survey of the condition of the knob and tube wiring in an attic prior to insulating attic, is incorporated herein.

(4) Any energized knob and tube wiring that has been abandoned or serves no purpose must be removed or terminated per 110.14(B).

Part II. Installation

394.10 Uses Permitted. Concealed knob-and-tube wiring shall be permitted to be installed in the hollow spaces of walls and ceilings, or in unfinished attics and roof spaces ((~~as provided by 394.23, only as follows:~~)) when approved by the authority having jurisdiction.

((~~(1) For extensions of existing installations~~

~~(2) Elsewhere by special permission~~))

394.25 Out of service and abandoned conductors. All out-of-service cable and abandoned conductors shall be removed from accessible ceiling and wall spaces unless tagged and terminated at both ends in accordance with SEC 300.15.

ARTICLE 398
Open Wiring on Insulators

Article 398 is not adopted.

((~~Part I. General~~

~~**398.1 Scope.** This article covers the use, installation, and construction specifications of open wiring on insulators.~~

~~**398.2 Definition.** The definition in this section shall apply within this article and throughout the *Code*.~~

~~**Open Wiring on Insulators.** An exposed wiring method using cleats, knobs, tubes, and flexible tubing for the protection and support of single insulated conductors run in or on buildings.~~

~~**Part II. Installation**~~

~~**398.10 Uses Permitted.** Open wiring on insulators shall be permitted only for industrial or agricultural establishments on systems of 600 volts, nominal, or less, as follows:~~

~~(1) Indoors or outdoors~~

~~(2) In wet or dry locations~~

~~(3) Where subject to corrosive vapors~~

~~(4) For services~~

~~**398.12 Uses Not Permitted.** Open wiring on insulators shall not be installed where concealed by the building structure.~~

~~**398.15 Exposed Work.**~~

~~**(A) Dry Locations.** In dry locations, where not exposed to physical damage, conductors shall be permitted to be separately enclosed in flexible nonmetallic tubing. The tubing shall be in continuous lengths not exceeding 4.5 m (15 ft) and secured to the surface by straps at intervals not exceeding 1.4 m (4 1/2 ft).~~

~~**(B) Entering Spaces Subject to Dampness, Wetness, or Corrosive Vapors.** Conductors entering or leaving locations subject to dampness, wetness, or corrosive vapors shall have drip loops formed on them and shall then pass upward and inward from the outside of the buildings, or from the damp, wet, or corrosive location, through noncombustible, nonabsorbent insulating tubes.~~

~~Informational Note: See 230.52 for individual conductors entering buildings or other structures.~~

~~**(C) Exposed to Physical Damage.** Conductors within 2.1 m (7 ft) from the floor shall be considered exposed to physical damage. Where open conductors cross ceiling joists and wall studs and are exposed to physical damage, they shall be protected by one of the following methods:~~

~~(1) Guard strips not less than 25 mm (1 in.) nominal in thickness and at least as high as the insulating supports, placed on each side of and close to the wiring.~~

~~(2) A substantial running board at least 13 mm (1/2 in.) thick in back of the conductors with side protections. Running boards shall extend at least 25 mm (1 in.) outside the conductors, but not more than 50 mm (2 in.), and the protecting sides shall be at least 50 mm (2 in.) high and at least 25 mm (1 in.), nominal, in thickness.~~

~~(3) Boxing made in accordance with 398.15(C)(1) or (C)(2) and furnished with a cover kept at least 25 mm (1 in.) away from the conductors within. Where protecting vertical conductors on side walls, the boxing shall be closed at the top and the holes through which the conductors pass shall be bushed.~~

~~(4) Rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, or electrical metallic tubing. When installed in metal piping, the conductors shall be encased in continuous lengths of approved flexible tubing.~~

~~**398.17 Through or Parallel to Framing Members.** Open conductors shall be separated from contact with walls, floors, wood cross members, or partitions through which they pass by tubes or bushings of noncombustible, nonabsorbent insulating material. Where the bushing is shorter than the hole, a waterproof sleeve of noninductive material shall be inserted in the hole and an insulating bushing slipped into the sleeve at each end in such a manner as to keep the conductors absolutely out of contact with the sleeve. Each conductor shall be carried through a separate tube or sleeve.~~

~~Informational Note: See 310.15(A)(3) for temperature limitation of conductors.~~

~~**398.19 Clearances.** Open conductors shall be separated at least 50 mm (2 in.) from metal raceways, piping, or other conducting material, and from any exposed lighting, power, or signaling conductor, or shall be separated therefrom by a continuous and firmly fixed nonconductor in addition to the insulation of the conductor. Where any insulating tube is used, it shall be secured at the ends. Where practicable, conductors shall pass over rather than under any piping subject to leakage or accumulations of moisture.~~

~~**398.23 In Accessible Attics.** Conductors in unfinished attics and roof spaces shall comply with 398.23(A) or (B).~~

~~**(A) Accessible by Stairway or Permanent Ladder.** Conductor shall be installed along the side of or through bored holes in floor joists, studs, or rafters. Where run through bored holes, conductors in the joists and in studs or rafters to a height of not less than 2.1 m (7 ft) above the floor or floor joists shall be protected by substantial running boards extending not less than 25 mm (1 in.) on each side of the conductors. Running boards shall be securely fastened in place. Running boards and guard strips shall not be required for conductors installed along the sides of joists, studs, or rafters.~~

~~**(B) Not Accessible by Stairway or Permanent Ladder.** Conductors shall be installed along the sides of or through bored holes in floor joists, studs, or rafters.~~

~~*Exception: In buildings completed before the wiring is installed, in attic and roof spaces that are not accessible by stairway or permanent ladder and have headroom at all points less than 900 mm (3 ft), the wiring shall be permitted to be installed on the edges of rafters or joists facing the attic or roof space.*~~

~~**398.30 Securing and Supporting.**~~

~~**(A) Conductor Sizes Smaller Than 8 AWG.** Conductors smaller than 8 AWG shall be rigidly supported on noncombustible, nonabsorbent insulating materials and shall not contact any other objects. Supports shall be installed as follows:~~

~~(1) Within 150 mm (6 in.) from a tap or splice~~

~~(2) Within 300 mm (12 in.) of a dead-end connection to a lampholder or receptacle~~

~~(3) At intervals not exceeding 1.4 m (4 1/2 ft) and at closer intervals sufficient to provide adequate support where likely to be disturbed~~

~~**(B) Conductor Sizes 8 AWG and Larger.** Supports for conductors 8 AWG or larger installed across open spaces shall be permitted up to 4.5 m (15 ft) apart if noncombustible, nonabsorbent insulating spacers are used at least every 1.4 m (4 1/2 ft) to maintain at least 65 mm (2 1/2 in.) between conductors.~~

~~Where not likely to be disturbed in buildings of mill construction, 8 AWG and larger conductors shall be permitted to be run across open spaces if supported from each wood cross member on approved insulators maintaining 150 mm (6 in.) between conductors.~~

~~**(C) Industrial Establishments.** In industrial establishments only, where conditions of maintenance and supervision ensure that only qualified persons service the system, conductors of sizes 250 kcmil and larger shall be permitted to be run across open spaces where supported at intervals up to 9.0 m (30 ft) apart.~~

~~**(D) Mounting of Conductor Supports.** Where nails are used to mount knobs, they shall not be smaller than tenpenny. Where screws are used to mount knobs, or where nails or screws are used to mount cleats, they shall be of a length~~

~~sufficient to penetrate the wood to a depth equal to at least one-half the height of the knob and the full thickness of the cleat. Cushion washers shall be used with nails.~~

~~**(E) Tie Wires.** Conductors 8 AWG or larger and supported on solid knobs shall be securely tied thereto by tie wires having an insulation equivalent to that of the conductor.~~

~~**398.42 Devices.** Surface-type snap switches shall be mounted in accordance with 404.10(A), and boxes shall not be required. Other type switches shall be installed in accordance with 404.4.~~

~~**Part III.Construction Specifications.**~~

~~**398.104 Conductors.** Conductors shall be of a type specified by Article 310.))~~

ARTICLE 404
Switches

404.3 Enclosure.

(A) General. Switches and circuit breakers shall be of the externally operable type mounted in an enclosure listed for the intended use. The minimum wire-bending space at terminals and minimum gutter space provided in switch enclosures shall be as required in 312.6.

((~~Exception No. 1: Pendant- and surface-type snap switches and knife switches mounted on an open-face switchboard or panelboard shall be permitted without enclosures.~~

~~Exception No. 2: Switches and circuit breakers installed in accordance with 110.27(A)(1), (A)(2), (A)(3), or (A)(4) shall be permitted without enclosures.~~))

(B) Used as a Raceway. Enclosures shall not be used as junction boxes, auxiliary gutters, or raceways for conductors feeding through or tapping off to other switches or overcurrent devices, unless the enclosure complies with 312.8.

404.10 Mounting of General-Use Snap Switches, Dimmers, and Control Switches.

(A) ((~~Surface Type.~~ ~~General-use snap switches, dimmers, and control switches used with open wiring on insulators shall be mounted on insulating material that separates the conductors at least 13 mm (1/2 in.) from the surface wired over.~~)) Reserved.

(B) Box Mounted. Flush-type general-use snap switches, dimmers, and control switches mounted in boxes that are set back of the finished surface as permitted in 314.20 shall be installed so that the extension plaster ears are seated against the surface. Flush-type devices mounted in boxes that are flush with the finished surface or project from it shall be installed so that the mounting yoke or strap of the device is seated against the box. Screws used for the purpose of attaching a device to a box shall be of the type provided with a listed device, or shall be machine screws having 32 threads per inch or part of listed assemblies or systems, in accordance with the manufacturer's instructions.

404.13 Knife Switches.

(A) Isolating Switches. Knife switches rated at over 1200 amperes at 250 volts or less, and at over 1000 amperes at 251 to 1000 volts, shall be used only as isolating switches and shall not be opened under load.

(B) To Interrupt Currents. To interrupt currents over 1200 amperes at 250 volts, nominal, or less, or over 600 amperes at 251 to 1000 volts, nominal, a circuit breaker or a switch listed for such purpose shall be used.

(C) General-Use Switches. Knife switches of ratings less than specified in 404.13(A) and (B) shall be considered general-use switches.

Informational Note: See the definition of General-Use Switch in Article 100.

(D) Motor-Circuit Switches. Motor-circuit switches shall be permitted to be of the knife-switch type.

Informational Note: See the definition of a *Motor-Circuit Switch* in Article 100.

(E) Interlocking. All switches shall be interlocking type to prevent the door from being opened when the switch is in the ON position. All switches used as service disconnecting means and those rated over 300 volts shall be of the two-way interlocking type.

For the purpose of this provision, "two-way interlocking" means that the door is prevented from being opened when the switch is ON and prevents the switch from being turned ON when the door is open.

ARTICLE 406
Receptacles, Cord Connectors and Attachment Plugs (Caps)

Δ **406.12 Tamper-Resistant Receptacles.** All 15- and 20-ampere, 125- and 250-volt nonlocking-type receptacles in the areas specified in 406.12(1) through (8) shall be listed tamper-resistant receptacles.

(1) Dwelling units, including attached and detached garages and accessory buildings to dwelling units, and common areas of multifamily dwellings specified in 210.52 and 550.13

(2) Guest rooms and guest suites of hotels, motels, and their common areas

(3) Child care facilities

(4) Preschools and education facilities

(5) Business offices, corridors, waiting rooms and the like in clinics, medical and dental offices, and outpatient facilities

(6) Subset of assembly occupancies described in 518.2 to include places of awaiting transportation, gymnasiums, skating rinks, and auditoriums

(7) Dormitory units

(8) Assisted living facilities

Informational Note No. 1: This requirement would include receptacles identified as 5-15, 5-20, 6-15, and 6-20 in ANSI/NEMA, WD 6-2016, *Wiring Devices—Dimensional Specifications.*

Informational Note No. 2: Assisted living facilities are Institutional Use Group I-1 per IBC ((~~2015~~)) 2018

(9) Psychiatric patient care facilities where accessible to psychiatric patients and children five years of age and under.

Informational Note No.3 : WAC 296-46B-406R, requirements for tamper-resistant receptacles in psychiatric care facilities, is incorporated herein with edits.

Exception to (1), (2), (3), (4), (5), (6), (7) and (8): Receptacles in the following locations shall not be required to be tamper resistant:

(1) Receptacles located more than 1.7 m (5 1/2 ft) above the floor
(2) Receptacles that are part of a luminaire or appliance
(3) A single receptacle, or a duplex receptacle for two appliances, located within the dedicated space for each appliance that, in normal use, is not easily moved from one place to another and that is cord-and-plug-connected in accordance with 400.10(A)(6), (A)(7), or (A)(8)
(4) Nongrounding receptacles used for replacements as permitted in 406.4(D)(2)(a)

ARTICLE 410
Luminaires, Lampholders, and Lamps

410.10 Luminaires in Specific Locations.

(A) Wet and Damp Locations. Luminaires installed in wet or damp locations shall be installed such that water cannot enter or accumulate in wiring compartments, lampholders, or other electrical parts. All luminaires installed in wet locations shall be marked, "Suitable for Wet Locations." All luminaires installed in damp locations shall be marked "Suitable for Wet Locations" or "Suitable for Damp Locations."

(B) Corrosive Locations. Luminaires installed in corrosive locations shall be of a type suitable for such locations.

(C) In Ducts or Hoods. Luminaires shall be permitted to be installed in commercial cooking hoods where all of the following conditions are met:

(1) The luminaire shall be identified for use within commercial cooking hoods and installed such that the temperature limits of the materials used are not exceeded.

(2) The luminaire shall be constructed so that all exhaust vapors, grease, oil, or cooking vapors are excluded from the lamp and wiring compartment. Diffusers shall be resistant to thermal shock.

(3) Parts of the luminaire exposed within the hood shall be corrosion resistant or protected against corrosion, and the surface shall be smooth so as not to collect deposits and to facilitate cleaning.

(4) Wiring methods and materials supplying the luminaire(s) shall not be exposed within the cooking hood.

Informational Note: See 110.11 for conductors and equipment exposed to deteriorating agents.

(D) Bathtub and Shower Areas. A luminaire installed in a bathtub or shower area shall meet all of the following requirements:

N (1) No parts of cord-connected luminaires, chain-, cable-, or cord-suspended luminaires, lighting track, pendants, or ceiling-suspended (paddle) fans shall be located within a zone measured ((~~900 mm (3 ft)~~)) 1.5 M (5 ft) horizontally and 2.5 m (8 ft) vertically from the top of the bathtub rim or shower stall threshold. This zone is all-encompassing and includes the space directly over the tub or shower stall.

N (2) Luminaires located within the actual outside dimension of the bathtub or shower to a height of 2.5 m (8 ft) vertically from the top of the bathtub rim or shower threshold shall be marked suitable for damp locations or marked suitable for wet locations. Luminaires located where subject to shower spray shall be marked suitable for wet locations. Luminaires, with exposed metal parts that are grounded, must be ground fault circuit interrupter protected.

Informational Note: WAC 296-46B-410 requirements for protective equipment are incorporated herein with edits.

(E) Luminaires in Indoor Sports, Mixed-Use, and All-Purpose Facilities. Luminaires subject to physical damage, using a mercury vapor or metal halide lamp, installed in playing and spectator seating areas of indoor sports, mixed-use, or all-purpose facilities shall be of the type that protects the lamp with a glass or plastic lens. Such luminaires shall be permitted to have an additional guard.

(F) Luminaires Installed in or Under Roof Decking. Luminaires installed in exposed or concealed locations under metal-corrugated sheet roof decking shall be installed and supported so there is not less than 38 mm (1 1/2 in.) measured from the lowest surface of the roof decking to the top of the luminaire.

ARTICLE 440
Air-Conditioning and Refrigerating Equipment

440.14 Location. Disconnecting means shall be located within sight from, and readily accessible from the air-conditioning or refrigerating equipment. The disconnecting means shall be permitted to be installed on or within the air-conditioning or refrigerating equipment.

The disconnecting means shall not be located on panels that are designed to allow access to the air-conditioning or refrigeration equipment or to obscure the equipment nameplate(s).

Exception No. 1: Where the disconnecting means provided in accordance with 430.102(A) is lockable in accordance with 110.25 and the refrigerating or air-conditioning equipment is essential to an industrial process in a facility with written safety procedures, and where the conditions of maintenance and supervision ensure that only qualified persons service the equipment, a disconnecting means within sight from the equipment shall not be required.

Exception No. 2: Where an attachment plug and receptacle serve as the disconnecting means in accordance with 440.13, their location shall be accessible but shall not be required to be readily accessible.

Exception 3: In dwelling units, a disconnecting means is required for the indoor unit(s) of a split system HVAC/R system, unless the outside unit's disconnecting means is lockable and disconnects the indoor unit, and an indoor disconnecting means is not required by the manufacturer.

Informational Note No. 1: See Parts VII and IX of Article 430 for additional requirements.

Informational Note No. 2: See 110.26.

ARTICLE 450
Transformers and Transformer Vaults (including Secondary Ties)

Δ **450.9 Ventilation.** The ventilation shall dispose of the transformer full-load heat losses without creating a temperature rise that is in excess of the transformer rating.

Informational Note No. 1: See IEEE C57.12.00-2015, *General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers*, and IEEE C57.12.01-2015, *General Requirements for Dry-Type Distribution and Power Transformers*.

Informational Note No. 2: Additional losses occur in some transformers where nonsinusoidal currents are present, resulting in increased heat in the transformer above its rating. See IEEE C57.110-2008, *Recommended Practice for Establishing Liquid-Filled and Dry-Type Power and Distribution Transformer Capability When Supplying Nonsinusoidal Load Currents*, where transformers are utilized with nonlinear loads.

Informational Note No. 3: See *Seattle Building Code* Chapter 4, *Special Detailed Requirements Based on Use and Occupancy*, for additional private and utility vault ventilation and other minimum construction requirements.

Transformers with ventilating openings shall be installed so that the ventilating openings are not blocked by walls or other obstructions. The required clearances shall be clearly marked on the transformer. Transformer top surfaces that are horizontal and readily accessible shall be marked to prohibit storage.

450.19 Location of Pad-Mounted Transformers. To determine the approved location of pad-mounted transformers, see *Seattle Building Code* Chapter 4, *Special Detailed Requirements Based on Use and Occupancy*, for private and utility vault minimum standards.

450.20 Rating of Dry-Type Transformers. Dry-type transformers shall be rated not less than the load served as determined in accordance with Article 220 of this *Code*.

450.26 Oil-Insulated Transformers Installed Indoors. Oil-insulated transformers installed indoors shall be installed in a vault constructed as specified in ((~~Part III of this article~~)) Chapter 4 of the *Seattle Building Code*.

((~~Exception No. 1: Where the total capacity does not exceed 112 1/2 kVA, the vault specified in Part III of this article shall be permitted to be constructed of reinforced concrete that is not less than 100 mm (4 in.) thick.~~))

Exception No. ((~~2~~)) 1: Where the nominal voltage does not exceed 1,000, a vault shall not be required if suitable arrangements are made to prevent a transformer oil fire from igniting other materials and the total capacity in one location does not exceed 10 kVA in a section of the building classified as combustible or 75 kVA where the surrounding structure is classified as fire-resistant construction.

Exception No. ((~~3~~)) 2: Electric furnace transformers that have a total rating not exceeding 75 kVA shall be permitted to be installed without a vault in a building or room of fire-resistant construction, provided suitable arrangements are made to prevent a transformer oil fire from spreading to other combustible material.

Exception No. ((~~4~~)) 3: A transformer that has a total rating not exceeding 75 kVA and a supply voltage of 1,000 volts or less that is an integral part of charged-particle-accelerating equipment shall be permitted to be installed without a vault in a building or room of noncombustible or fire-resistant construction, provided suitable arrangements are made to prevent a transformer oil fire from spreading to other combustible material.

Exception No. ((~~5~~)) 4: Transformers shall be permitted to be installed in a detached building that does not comply with ((~~Part III of this article~~)) Chapter 4 of the Seattle Building Code if neither the building nor its contents present a fire hazard to any other building or property, and if the building is used only in supplying electric service and the interior is accessible only to qualified persons.

((~~Exception No. 6: Oil-insulated transformers shall be permitted to be used without a vault in portable and mobile surface mining equipment (such as electric excavators) if each of the following conditions is met:~~
~~(1) Provision is made for draining leaking fluid to the ground.~~
~~(2) Safe egress is provided for personnel.~~
~~(3) A minimum 6-mm (1/4-in.) steel barrier is provided for personnel protection.~~))

450.27 Oil-Insulated Transformers Installed Outdoors. ((~~Combustible material, combustible buildings, and parts of buildings, fire escapes, and door and window openings shall be safeguarded from fires originating in oil-insulated transformers installed on roofs, attached to or adjacent to a building or combustible material.~~

~~In cases where the transformer installation presents a fire hazard, one or more of the following safeguards shall be applied according to the degree of hazard involved:~~

~~(1) Space separations~~

~~(2) Fire-resistant barriers~~

~~(3) Automatic fire suppression systems~~

~~(4) Enclosures that confine the oil of a ruptured transformer tank~~

~~Oil enclosures shall be permitted to consist of fire-resistant dikes, curbed areas or basins, or trenches filled with coarse, crushed stone. Oil enclosures shall be provided with trapped drains where the exposure and the quantity of oil involved are such that removal of oil is important.~~

~~Informational Note: For additional information on transformers installed on poles or structures or underground, see ANSI IEEE C2-2017, *National Electrical Safety Code*.~~))

(A) Requirements. Oil-insulated transformers installed outdoors shall meet the following requirements:

(1) A transformer installed adjacent to a building or structure having a combustible surface shall be located no closer than 2.4 m (8 ft) to the building or structure and shall be outside a line extended vertically from the ends of the eaves or rooflines as illustrated in the shaded "Approved Transformer Area" shown in Figure 450-1;

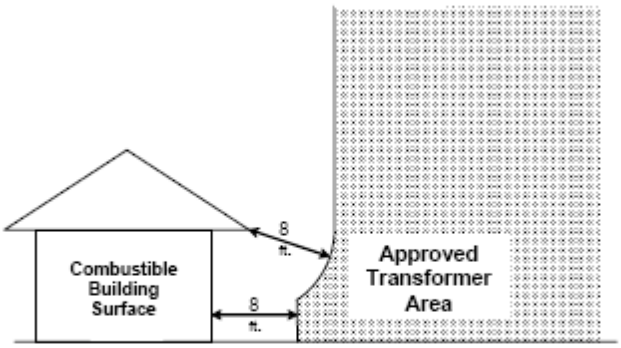

Figure 450-1

(2) A transformer installed adjacent to a building or structure with no combustible surface shall be located no closer than 610 mm (2 ft) to the building or structure and shall be outside a line extended vertically from the ends of the eaves or rooflines as illustrated in the shaded "Approved Transformer Area" shown in Figure 450-2.

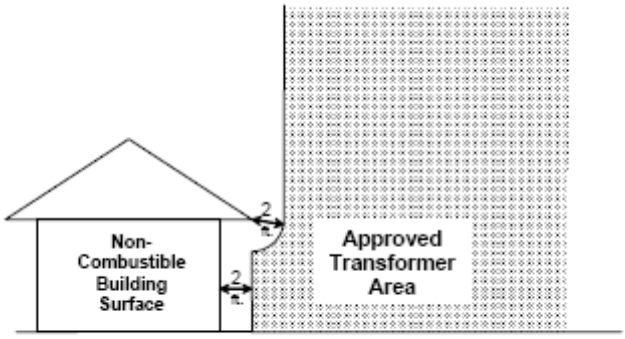

Figure 450-2

(3) A building or structure shall have no doorway, unprotected window, stairway, or other openings closer than 3.0 m (10 ft) to the transformer;

(4) The finished grade at the location of the transformer shall have a containment sill such that any oil leaking from a transformer will be contained. The containment sill shall be as high as necessary to contain the oil of one transformer but in no case less than 100 mm (4 in.) high.

(5) If transformers are installed in areas subject to traffic other than pedestrian traffic, they shall be provided with adequate guarding.

(B) Locations. Openings in enclosures for total underground oil-filled transformers shall be located no closer than 3.0 m (10 ft) of a doorway, operable window, stairway or fire escape. Adequate space must be maintained above the enclosure so that a boom may be used to lift the transformer from the enclosure.

Part III.Transformer Vaults

Sections 450.41 through 450.48 are not adopted. See Chapter 4 of the *Seattle Building Code* for transformer vault requirements.

~~((**450.41 Location.** Vaults shall be located where they can be ventilated to the outside air without using flues or ducts wherever such an arrangement is practicable.~~

~~**450.42 Walls, Roofs, and Floors.** The walls and roofs of vaults shall be constructed of materials that have approved structural strength for the conditions with a minimum fire resistance of 3 hours. The floors of vaults in contact with the earth shall be of concrete that is not less than 100 mm (4 in.) thick, but, where the vault is constructed with a vacant space or other stories below it, the floor shall have approved structural strength for the load imposed thereon and a minimum fire resistance of 3 hours. For the purposes of this section, studs and wallboard construction shall not be permitted.~~

~~*Exception: Where transformers are protected with automatic sprinkler, water spray, carbon dioxide, or halon, construction of 1-hour rating shall be permitted.*~~

~~Informational Note No. 1: For additional information, see ASTM E119-18a, *Methods for Fire Tests of Building Construction and Materials.*~~

~~Informational Note No. 2: A typical 3-hour construction is 150 mm (6 in.) thick reinforced concrete.~~

~~**450.43 Doorways.** Vault doorways shall be protected in accordance with 450.43(A), (B), and (C).~~

(A) Type of Door. Each doorway leading into a vault from the building interior shall be provided with a tight-fitting door that has a minimum fire rating of 3 hours. The authority having jurisdiction shall be permitted to require such a door for an exterior wall opening where conditions warrant.

~~*Exception: Where transformers are protected with automatic sprinkler, water spray, carbon dioxide, or halon, construction of 1-hour rating shall be permitted.*~~

~~Informational Note: For additional information, see NFPA 80-2016, *Standard for Fire Doors and Other Opening Protectives*.~~

(B) Sills. A door sill or curb that is of an approved height that will confine the oil from the largest transformer within the vault shall be provided, and in no case shall the height be less than 100 mm (4 in.).

(C) Locks. Doors shall be equipped with locks, and doors shall be kept locked, with access being allowed only to qualified persons. Personnel doors shall open in the direction of egress and be equipped with listed fire exit hardware.

~~**450.45 Ventilation Openings.** Where required by 450.9, openings for ventilation shall be provided in accordance with 450.45(A) through (F).~~

~~**(A) Location.** Ventilation openings shall be located as far as possible from doors, windows, fire escapes, and combustible material.~~

~~**(B) Arrangement.** A vault ventilated by natural circulation of air shall be permitted to have roughly half of the total area of openings required for ventilation in one or more openings near the floor and the remainder in one or more~~

~~openings in the roof or in the sidewalls near the roof, or all of the area required for ventilation shall be permitted in one or more openings in or near the roof.~~

~~**(C) Size.** For a vault ventilated by natural circulation of air to an outdoor area, the combined net area of all ventilating openings, after deducting the area occupied by screens, gratings, or louvers, shall not be less than 1900 mm^2 (3 in.^{2}) per kVA of transformer capacity in service, and in no case shall the net area be less than 0.1 m^2 (1 ft^2) for any capacity under 50 kVA.~~

~~**(D) Covering.** Ventilation openings shall be covered with durable gratings, screens, or louvers, according to the treatment required in order to avoid unsafe conditions.~~

~~**(E) Dampers.** All ventilation openings to the indoors shall be provided with automatic closing fire dampers that operate in response to a vault fire. Such dampers shall possess a standard fire rating of not less than 1-1/2 hours.~~

~~Informational Note: See ANSI/UL 555-2016, *Standard for Fire Dampers*.~~

~~**(F) Ducts.** Ventilating ducts shall be constructed of fire-resistant material.~~

~~**450.46 Drainage.** Where practicable, vaults containing more than 100 kVA transformer capacity shall be provided with a drain or other means that will carry off any accumulation of oil or water in the vault unless local conditions make this impracticable. The floor shall be pitched to the drain where provided.~~

~~**450.47 Water Pipes and Accessories.** Any pipe or duct system foreign to the electrical installation shall not enter or pass through a transformer vault. Piping or other facilities provided for vault fire protection, or for transformer cooling, shall not be considered foreign to the electrical installation.~~

~~**450.48 Storage in Vaults.** Materials shall not be stored in transformer vaults.~~))

ARTICLE 500
Hazardous (Classified) Locations Classes I, II, and III, Divisions 1 and 2

500.5 Classifications of Locations

Δ **(A) General.** Locations shall be classified depending on the properties of the flammable gas, flammable liquid–produced vapor, combustible liquid–produced vapors, combustible dusts, or fibers/flyings that could be present, and the likelihood that a flammable or combustible concentration or quantity is present. Each room, section, or area shall be considered individually in determining its classification. Where pyrophoric materials are the only materials used or handled, these locations are outside the scope of this article.

Informational Note: Through the exercise of ingenuity in the layout of electrical installations for hazardous (classified) locations, it is frequently possible to locate much of the equipment in a reduced level of classification or in an unclassified location and, thus, to reduce the amount of special equipment required.

Refrigerant machinery rooms that contain ammonia refrigeration systems and are equipped with adequate mechanical ventilation that operates continuously or is initiated by a detection system at a concentration not exceeding 150 ppm shall be permitted to be classified as "unclassified" locations.

Informational Note: For further information regarding classification and ventilation of areas involving closed-circuit ammonia refrigeration systems, see ANSI/IIAR 2-2014, *Standard for Safe Design of Closed-Circuit Ammonia Refrigeration Systems*.

(B) Class I Locations. Class I locations are those in which flammable gases, flammable liquid–produced vapors, or combustible liquid–produced vapors are or may be present in the air in quantities sufficient to produce explosive or ignitible mixtures. Class I locations shall include those specified in 500.5(B)(1) and (B)(2).

(1) Class I, Division 1. A Class I, Division 1 location is a location:

(1) In which ignitible concentrations of flammable gases, flammable liquid–produced vapors, or combustible liquid–produced vapors can exist under normal operating conditions, or

(2) In which ignitible concentrations of such flammable gases, flammable liquid–produced vapors, or combustible liquids above their flash points may exist frequently because of repair or maintenance operations or because of leakage, or

(3) In which breakdown or faulty operation of equipment or processes might release ignitible concentrations of flammable gases, flammable liquid–produced vapors, or combustible liquid–produced vapors and might also cause simultaneous failure of electrical equipment in such a way as to directly cause the electrical equipment to become a source of ignition

(4) In which ignitible concentrations of flammable gases, flammable liquid–produced vapors, or combustible liquid–produced vapors can exist under normal operating conditions in a below grade sump(s) installed in a parking garage(s) and directly cause the electrical sump pump equipment to become a source of ignition.

Exception to (4): The parking garage location may be considered unclassified when an engineer, licensed by the State of Washington, provides sufficient documentation that is stamped and signed by the engineer.

Informational Note No. 1: This classification usually includes the following locations:

(1) Where volatile flammable liquids or liquefied flammable gases are transferred from one container to another
(2) Interiors of spray booths and areas in the vicinity of spraying and painting operations where volatile flammable solvents are used
(3) Locations containing open tanks or vats of volatile flammable liquids
(4) Drying rooms or compartments for the evaporation of flammable solvents
(5) Locations containing fat- and oil-extraction equipment using volatile flammable solvent
(6) Portions of cleaning and dyeing plants where flammable liquids are used
(7) Gas generator rooms and other portions of gas manufacturing plants where flammable gas may escape
(8) Inadequately ventilated pump rooms for flammable gas or for volatile flammable liquids
(9) The interiors of refrigerators and freezers in which volatile flammable materials are stored in open, lightly stoppered, or easily ruptured containers

(10) All other locations where ignitible concentrations of flammable vapors or gases are likely to occur in the course of normal operations

Informational Note No. 2: In some Division 1 locations, ignitible concentrations of flammable gases or vapors may be present continuously or for long periods of time. Examples include the following:

(1) The inside of inadequately vented enclosures containing instruments normally venting flammable gases or vapors to the interior of the enclosure
(2) The inside of vented tanks containing volatile flammable liquids
(3) The area between the inner and outer roof sections of a floating roof tank containing volatile flammable fluids
(4) Inadequately ventilated areas within spraying or coating operations using volatile flammable fluids
(5) The interior of an exhaust duct that is used to vent ignitible concentrations of gases or vapors

Experience has demonstrated the prudence of avoiding the installation of instrumentation or other electrical equipment in these particular areas altogether or where it cannot be avoided because it is essential to the process and other locations are not feasible [see 500.5(A), Informational Note] using electrical equipment or instrumentation approved for the specific application or consisting of intrinsically safe systems as described in Article 504.

ARTICLE 517
Healthcare Facilities

517.31 Requirements for the Essential Electrical System.

Δ **(A) Separate Branches.** Type 1 essential electrical systems shall be comprised of three separate branches capable of supplying a limited amount of lighting and power service that is considered essential for life safety and effective hospital operation during the time the normal electrical service is interrupted for any reason. The three branches are life safety, critical, and equipment.

The division between the branches shall occur at transfer switches where more than one transfer switch is required. [**99:**6.7.2.3.1]

Δ **(B) Transfer Switches.** Transfer switches shall be in accordance with one of the following:

(1) The number of transfer switches to be used shall be based on reliability and design. Each branch of the essential electrical system shall have one or more transfer switches.

(2) One transfer switch shall be permitted to serve one or more branches in a facility with a continuous load on the switch of 150 kVA (120 kW) or less. [**99:**6.7.6.2.1.4]

Informational Note No. 1: See NFPA 99-2018, *Health Care Facilities Code*, 6.7.3.1, Transfer Switches; 6.7.2.2.5, Automatic Transfer Switch Features; 6.7.2.2.5.15, Nonautomatic Transfer Switch Features; and 6.7.2.2.7, Nonautomatic Transfer Device Features.

Informational Note No. 2: See Informational Note Figure 517.31(a).

Informational Note No. 3: See Informational Note Figure 517.31(b).

(1) Optional Loads. Loads served by the generating equipment not specifically named in Article 517 shall be served by their own transfer switches such that the following conditions apply:

(1) These loads shall not be transferred if the transfer will overload the generating equipment.

(2) These loads shall be automatically shed upon generating equipment overloading.

(2) Contiguous Facilities. Hospital power sources and alternate power sources shall be permitted to serve the essential electrical systems of contiguous or same site facilities.

(C) Wiring Requirements.

Δ **(1) Separation from Other Circuits.** The life safety branch and critical branch [of the essential electrical system] shall be kept independent of all other wiring and equipment. [**99:** 6.7.5.2.1]

(a) Raceways, cables, or enclosures of the life safety and critical branch shall be readily identified as a component of the essential electrical system (EES). Boxes and enclosures (including transfer switches, generators, and power panels) shall be field- or factory-marked and identified as a component of the EES. Raceways and cables shall be field- or factory-marked as a component of the EES at intervals not to exceed 7.6 m (25 ft).

(b) Conductors of the life safety branch or critical branch shall not enter the same raceways, boxes, or cabinets with each other or any other wiring system. It shall be permitted for the branch conductors to occupy common equipment, raceways, boxes, or cabinets of other circuits not part of the life safety branch and critical branch where such wiring complies with one of the following:

(1) Is in transfer equipment enclosures

(2) Is in exit or emergency luminaires supplied from two sources

(3) Is in a common junction box attached to exit or emergency luminaires supplied from two sources

(4) Is for two or more circuits supplied from the same branch and same transfer switch

(c) The wiring of the equipment branch shall be permitted to occupy the same raceways, boxes, or cabinets of other circuits that are not part of the essential electrical system.

(d) Where Category 2 (general care) locations are served from two separate transfer switches on the essential electrical system in accordance with 517.18(A), Exception No. 3, the Category 2 (general care) circuits from the two separate systems shall be kept independent of each other.

(e) Where Category 1 (critical care) locations are served from two separate transfer switches on the essential electrical system in accordance with 517.19(A), Exception No. 2, the critical care circuits from the two separate systems shall be kept independent of each other.

(2) Isolated Power Systems. Where isolated power systems are installed in any of the areas in 517.34(A)(1) and (A)(2), each system shall be supplied by an individual circuit serving no other load.

(3) Mechanical Protection of the Essential Electrical System. The wiring of the life safety and critical branches shall be mechanically protected by raceways. [**99:**6.7.5.2.2] Where installed as branch circuits in patient care spaces, the installation shall comply with the requirements of 517.13(A) and (B) and 250.118. Only the following wiring methods shall be permitted:

(1) Nonflexible metal raceways, Type MI cable, Type RTRC marked with the suffix –XW, or Schedule 80 PVC conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

(2) Where encased in not less than 50 mm (2 in.) of concrete, Schedule 40 PVC conduit, flexible nonmetallic or jacketed metallic raceways, or jacketed metallic cable assemblies listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

(3) Listed flexible metal raceways and listed metal sheathed cable assemblies in any of the following:

a. Where used in listed prefabricated medical headwalls

b. In listed office furnishings

c. Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage

d. Where necessary for flexible connection to equipment

e. For equipment that requires a flexible connection due to movement, vibration, or operation

f. Luminaires installed in ceiling structures

(4) Flexible power cords of appliances or other utilization equipment connected to the emergency system.

(5) Cables for Class 2 or Class 3 systems permitted by Part VI of this article, with or without raceways.

Informational Note: See 517.13 for additional grounding requirements in patient care areas.

(D) Capacity of Systems. The essential electrical system shall have the capacity and rating to meet the maximum actual demand likely to be produced by the connected load.

Feeders shall be sized in accordance with 215.2 and Part III of Article 220. The alternate power source(s) required in 517.30 shall have the capacity and rating to meet the demand produced by the load at any given time.

Demand calculations for sizing of the alternate power source(s) shall be based on any of the following:

(1) Prudent demand factors and historical data

(2) Connected load

(3) Feeder calculation procedures described in Article 220

(4) Any combination of the above

The sizing requirements in 700.4 and 701.4 shall not apply to alternate sources.

(E) Receptacle Identification. The cover plates for the electrical receptacles supplied from the life safety and critical branches shall have a distinctive color or marking so as to be readily identifiable. [**99:**6.7.2.3.5(B)]

(F) Feeders from Alternate Power Source. A single feeder supplied by a local or remote alternate source shall be permitted to supply the essential electrical equipment shall be permitted at other than the location of the alternate power source.

(G) Coordination. Overcurrent protective devices serving the essential electrical system shall be coordinated for the period of time that a fault's duration extends beyond 0.1 second.

Selective coordination shall be selected by a licensed professional engineer or other qualified person engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

Exception No. 1: Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exists on the transformer secondary.

Exception No. 2: Between overcurrent protective devices of the same size (ampere rating) in series.

Informational Note No. 1: The terms *coordination* and *coordinated* as used in this section do not cover the full range of overcurrent conditions.

Informational Note No. 2: See 517.17(C) for information on requirements for the coordination of ground-fault protection.

ARTICLE 555
Marinas, Boatyards, Floating Buildings, and Commercial and Noncommercial Docking Facilities

555.4 Location of Service Equipment. The service equipment for a floating building, dock, or marina shall be located on land adjacent to the structure served, but not on or in the structure itself or any other floating structure.

Exception: In existing installations, the service may be located in or on the building only by prior approval from the authority having jurisdiction.

555.25 Luminaires Required. All walkways over water shall be illuminated to provide safe egress.

Informational Note: Chapter 4 of the *Seattle Building Code* requires that waterfront structures comply with Chapter 10 for means of egress requirements, including illumination.

N **555.53 Ground-Fault Protection.** The main overcurrent protective device that feeds the floating building shall have ground-fault protection not exceeding ((~~100~~)) 30 mA. Ground-fault protection of each individual branch or feeder circuit shall be permitted as a suitable alternative.

ARTICLE 600
Electric Signs and Outline Lighting

Part I. General

600.1 Scope. This article covers the installation of conductors, equipment, and field wiring for electric signs, retrofit kits, and outline lighting, regardless of voltage. All installations and equipment using neon tubing, such as signs, decorative elements, skeleton tubing, or art forms, are covered by this article.

Additionally, each of the following is covered by this article:

(1) All electrical signs and outline lighting, regardless of voltage must be listed to the applicable ANSI UL Standard. Installations will be inspected for compliance with installation instructions and this *Code*.

(2) Luminaires in outdoor awnings must be suitable for wet locations and be connected by a wiring method suitable for wet locations.

(3) Fluorescent and LED luminaires must be located at least 152 mm (6 in.) from the awning fabric. Incandescent lamps or luminaires must be located at least 457 mm (18 in.) from awning fabric. A disconnecting means must be installed per Article 600 of this *Code*.

(4) Listed awning signs must be installed in compliance with the manufacturer's instructions and this *Code*.

(5) Retrofitting Signs. When listed signs or listed outline lighting are retrofitted to an LED light source, a licensed general electrical contractor or an electrical sign contractor using properly certified individuals or properly supervised trainees may make the retrofit in place so long as the retrofit kit is listed and a new sign permit is obtained prior to the retrofit kit being installed. The retrofit kit manufacturer's installation instructions shall be made available for the inspector's use at the time of the inspection. The inspector shall be provided with an on-site means to verify the installation at the time of inspection.

Informational Note No. 1: Sign and outline lighting illumination systems include, but are not limited to, cold cathode neon tubing, high-intensity discharge lamps (HID), fluorescent or incandescent lamps, light-emitting diodes (LEDs), and electroluminescent and inductance lighting.

Informational Note No. 2: WAC 296-46B-600, requirements for electric signs and outline lighting, is incorporated herein with edits.

Informational Note No. 3: Inspections for retrofits must be scheduled at least 24 hours in advance of the work being performed.

600.2 Definitions. The definitions in this section shall apply only within this article.

Overhead Electrical Conductors. Any exterior electrical conductor, either bare or insulated, installed above the ground except those conductors enclosed in an approved raceway or enclosure. Overhead Electrical Conductors include but are not limited to overhead powerlines, overhead utility conductors, overhead service drops, overhead feeders, etc.

Informational Note: Also see Chapter 31 of the *Seattle Building Code* for regulation of signs and awnings.

600.9 Location.

(A) Vehicles. Sign or outline lighting system equipment shall be at least 4.3 m (14 ft) above areas accessible to vehicles unless protected from physical damage.

(B) Pedestrians. Neon tubing, other than listed, dry-location, portable signs, readily accessible to pedestrians shall be protected from physical damage.

Informational Note: See 600.41(D) for additional requirements.

(C) Adjacent to Combustible Materials. Signs and outline lighting systems shall be installed so that adjacent combustible materials are not subjected to temperatures in excess of 90°C (194°F).The spacing between wood or other combustible materials and an incandescent or HID lamp or lampholder shall not be less than 50 mm (2 in.).

(D) Wet Location. Signs and outline lighting system equipment for wet location use, other than listed watertight type, shall be weatherproof and have drain holes, as necessary, in accordance with the following:

(1) Drain holes shall not be larger than 13 mm (1/2 in.) or smaller than 6 mm (1/4 in.).

(2) Every low point or isolated section of the equipment shall have at least one drain hole.

(3) Drain holes shall be positioned such that there will be no external obstructions.

(E) Clearance from Overhead Electrical Conductors. Signs and outline lighting shall have clearances from energized power lines in accordance with the following:

(1) Proximity to Power Lines Rated at 1,000 Volts or Less. Signs and outline lighting shall be located no closer than 914 mm (3 ft) horizontally or 2.4 m (8 ft) vertically to overhead electrical conductors energized at 1,000 volts or less.

(2) Proximity to Power Lines Rated at More than 1,000 Volts. Signs and outline lighting shall be located no closer than 10 ft in any direction from overhead conductors energized at more than 1,000 volts.

Informational Note No. 1: Also see Chapter 31 of the *Seattle Building Code* for regulation of signs and awnings.

600.10 ((~~Portable or Mobile Signs.~~)) Reserved.

(((~~(A) Support.~~ ~~Portable or mobile signs shall be adequately supported and readily movable without the use of tools.~~

(B) Attachment Plug. An attachment plug shall be provided for each portable or mobile sign.

(C) Wet or Damp Location. Portable or mobile signs in wet or damp locations shall comply with 600.10(C)(1) and (C)(2).

~~**(1) Cords.** All cords shall be junior hard-service or hard-service types as designated in Table 400.4 and have an equipment grounding conductor.~~

~~**(2) Ground-Fault Circuit Interrupter.** In addition to the requirements in 210.8, the manufacturer of portable or mobile signs shall provide listed ground-fault circuit-interrupter protection for personnel. The ground-fault circuit interrupter shall be an integral part of the attachment plug or shall be located in the power-supply cord within 300 mm (12 in.) of the attachment plug.~~

~~**(D) Dry Location.** Portable or mobile signs in dry locations shall meet the following:~~

~~(1) Cords shall be SP-2, SPE-2, SPT-2, or heavier, as designated in Table 400.4.~~

~~(2) The cord shall not exceed 4.5 m (15 ft) in length.~~))

ARTICLE 620
Elevators, Dumbwaiters, Escalators, Moving Walks, Platform Lifts, and Stairway Chairlifts

Part I. General

Δ **620.1 Scope.** This article covers the installation of electrical equipment and wiring used in connection with elevators, dumbwaiters, escalators, moving walks, platform lifts, and stairway chairlifts.

Informational Note No. 1: For further information, see ASME A17.1-((~~2016~~))2019/CSA B44-16, *Safety Code for Elevators and Escalators.*

Informational Note No. 2: For further information, see CSA B44.1-11/ASME-A17.5-2014, *Elevator and Escalator Electrical Equipment.*

Informational Note No. 3: The term *wheelchair lift* has been changed to *platform lift*. For further information, see ASME A18.1-(~~2014~~) 2017, *Safety Standard for Platform Lifts and Stairway Chairlifts.*

Informational Note No. 4: See Chapter 7 of the *Seattle Building Code* for requirements to pressurize elevator hoistways and elevator lobbies.

Informational Note No. 5: See Chapter 10 of the *Seattle Building Code* for requirements for elevators serving as an accessible means of egress component (in buildings that have a required accessible floor that is four or more stories above or below the level of exit discharge) and for pressurization of elevator lobbies used as an area of refuge.

620.2 Definitions. The following definitions shall apply only within this article.

((~~Informational Note No. 1: The motor controller, motion controller, and operation controller are located in a single enclosure or a combination of enclosures.~~))

Informational Note((~~No. 2~~)):Informational Note Figure 620.2, No. 2 is for information only.

620.5 Working Clearances. Working space shall be provided about controllers, disconnecting means, and other electrical equipment in accordance with ((~~110.26(A) and 110.32).~~)) the *Seattle Building Code*, Chapter 30, and the following:

(1) The clear working space in front of a disconnecting means shall be not less than 1,220 mm (48 in.) in depth and 760 mm (30 in.) in width.

(2) Elevator machine rooms are required to have not less than 2,130 mm (84 in.) of headroom, per ASME A17.1-2010/CSA B44-10, Safety Code for Elevators and Escalators.

((~~Where conditions of maintenance and supervision ensure that only qualified persons examine, adjust, service, and maintain the equipment, the clearance requirements of 110.26(A) shall not be required where any of the conditions in 620.5(A) through (D) are met.~~

~~**(A) Flexible Connections to Equipment.** Electrical equipment in (A)(1) through (A)(4) is provided with flexible leads to all external connections so that it can be repositioned to meet the clear working space requirements of 110.26:~~

~~(1) Controllers and disconnecting means for dumbwaiters, escalators, moving walks, platform lifts, and stairway chairlifts installed in the same space with the driving machine~~

~~(2) Controllers and disconnecting means for elevators installed in the hoistway or on the car~~

~~(3) Controllers for door operators~~

~~(4) Other electrical equipment installed in the hoistway or on the car~~

~~**(B) Guards.** Live parts of the electrical equipment are suitably guarded, isolated, or insulated to reduce the likelihood of inadvertent contact with live parts operating at voltages greater than 30 volts ac rms, 42 volts ac peak, or 60 volts dc, and the equipment can be examined, adjusted, serviced, or maintained while energized without removal of this protection.~~

~~**(C) Examination, Adjusting, and Servicing.** Electrical equipment is not required to be examined, adjusted, serviced, or maintained while energized.~~

~~**(D) Low Voltage.** Uninsulated parts are at a voltage not greater than 30 volts rms, 42 volts peak, or 60 volts dc.~~))

620.21 Wiring Methods. Conductors, cables, and optical fiber cables located in hoistways, escalator and moving walk wellways, platform lifts, stairway chairlift runways, machinery spaces, control spaces, in or on cars, machine rooms, and control rooms, not including the traveling cables connecting the car or counterweight and hoistway wiring, shall be installed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, rigid nonmetallic conduit, or wireways ((~~or shall be Type MC, MI, or AC cable~~)) unless otherwise ((~~permitted~~)) specified in 620.21(A) through (C). Unused conductors in an enclosure shall be insulated or protected from accidental contact with exposed live parts.

Type MC cable or Type MI cable may be permitted to be installed in elevator spaces only by special permission of the authority having jurisdiction.

((~~Exception: Cords and cables of listed cord-and-plug-connected equipment shall not be required to be installed in a raceway.~~))

Informational Note: When an elevator is classified as a fire service access elevator or occupant evacuation operation elevator, some building codes require additional protection for conductors that are located outside of the elevator hoistway and machine room.

(A) Elevators.

(1) Hoistways and Pits.

(a) ((~~Cables used in Class 2 power-limited circuits shall be permitted, provided the cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.~~)) Feeders shall be permitted inside the hoistway for elevators with driving machine motors located in the hoistway or on the car or counterweight.

(b) Flexible cords and cables that are components of listed equipment and used in circuits operating at 30 volts rms or less or 42 volts dc or less shall be permitted, provided the cords and cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.

(c) The following wiring methods shall be permitted in the hoistway in lengths not to exceed 1.8 m (6 ft):

(1) Flexible metal conduit.

(2) Liquidtight flexible metal conduit.

(3) ((~~Liquidtight flexible nonmetallic conduit.~~)) Reserved

(4) Flexible cords and cables, or conductors grouped together and taped or corded, shall be permitted to be installed without a raceway. They shall be located to be protected from physical damage, shall be of a flame-retardant type, and shall be part of one of the following:

((~~(a) Listed equipment~~

~~(b) Driving machine~~

~~(c) Driving machine brake~~

((~~Exception 620.21(A)(1)(c)(1), (A)(1)(c)(2), and (A)(1)(c)(3): The conduit length shall not be required to be limited between risers and limit switches, interlocks, operating buttons, and similar devices.~~))

(d) A sump pump or oil recovery pump located in the pit shall be permitted to be cord connected. The cord shall be a hard usage oil-resistant type, of a length not to exceed 1.8 m (6 ft), and shall be located to be protected from physical damage.

((~~(e) Hard-service cords and junior hard-service cords that conform to the requirements of Article 400 (Table 400.4) shall be permitted as flexible connections between the fixed wiring in the hoistway and hoistway access switches when located in the hoistway door sight guard.~~

~~Informational Note: See ASME A17.1-2016/CSA B44-16, *Safety Code for Elevators and Escalators.*~~))

(e) Flexible metal conduit or liquidtight flexible metal conduit shall be permitted in hoistways between risers and limit switches, interlocks, operating buttons, and similar devices. Flexible conduit runs are limited to 1.8 m (6 ft) in length.

(f) Nonmetallic raceways and wireways shall not be installed in hoistways required to be of noncombustible fire-resistive construction.

(2) Cars.

(a) Flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit of metric designator 12 (trade size 3/8), or larger, not exceeding ((~~1.8 m (6 ft) in length~~)) 915 mm (3 ft), shall be permitted on cars where so located as to be free from oil and if securely fastened in place. Flexible conduit of any type shall not be placed in locations where it would be subject to physical damage.

((~~Exception: Liquidtight flexible nonmetallic conduit of metric designator 12 (trade size 3/8), or larger, as defined by 356.2(2), shall be permitted in lengths in excess of 1.8 m (6 ft).~~))

(b) Hard-service cords and junior hard-service cords that conform to the requirements of Article 400 (Table 400.4) shall be permitted as flexible connections between the fixed wiring on the car and devices on the car doors or gates. Hard-service cords only shall be permitted as flexible connections for the portable top-of-car operating device or the portable car-top work light. Devices or luminaires shall be grounded by means of an equipment grounding conductor run with the circuit conductors. Cables with smaller conductors and other types and thicknesses of insulation and jackets shall be permitted as flexible connections between the fixed wiring on the car and devices on the car doors or gates, if listed for this use.

(c) ((~~Flexible cords and cables that are components of listed equipment and used in circuits operating at 30 volts rms or less or 42 volts dc or less shall be permitted, provided the cords and cables are supported and protected from physical damage and are of a jacketed and flame-retardant type~~)) Nonmetallic raceways and wireways shall not be installed on cars located in hoistways required to be of noncombustible fire-resistive construction.

(d) The following wiring methods shall be permitted on the car assembly in lengths not to exceed ((~~1.8 m (6 ft)~~)) 3 ft:

(1) Flexible metal conduit

(2) Liquidtight flexible metal conduit

(3) Liquidtight flexible nonmetallic conduit

(4) Flexible cords and cables, or conductors grouped together and taped or corded, shall be permitted to be installed without a raceway. They shall be located to be protected from physical damage and shall be of a flame-retardant type and shall be part of one of the following:

a. Listed equipment

b. A driving machine

c. A driving machine brake

Δ **(3) Within Machine Rooms, Control Rooms, and Machinery Spaces and Control Spaces.**

(a) Flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit of metric designator 12 (trade size 3/8), or larger, not exceeding 1.8 m (6 ft) in length, shall be permitted between control panels and machine motors, machine brakes, motor-generator sets, disconnecting means, and pumping unit motors and valves.

((~~Exception: Liquidtight flexible nonmetallic conduit metric designator 12 (trade size 3/8) or larger, as defined in 356.2(2), shall be permitted to be installed in lengths in excess of 1.8 m (6 ft).~~))

(b) Where motor-generators, machine motors, or pumping unit motors and valves are located adjacent to or underneath control equipment and are provided with extra-length terminal leads not exceeding 1.8 m

(6 ft) in length, such leads shall be permitted to be extended to connect directly to controller terminal studs without regard to the carrying-capacity requirements of Articles 430 and 445. Auxiliary gutters shall be permitted in machine and control rooms between controllers, starters, and similar apparatus.

(c) Flexible cords and cables that are components of listed equipment and used in circuits operating at 30 volts rms or less or 42 volts dc or less shall be permitted, provided the cords and cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.

(d) On existing or listed equipment, conductors shall also be permitted to be grouped together and taped or corded without being installed in a raceway. Such cable groups shall be supported at intervals not over 900 mm (3 ft) and located so as to be protected from physical damage.

(e) Flexible cords and cables in lengths not to exceed ((~~1.8 m (6 ft)~~)) 915 mm (3 ft) that are of a flame-retardant type and located to be protected from physical damage shall be permitted in these rooms and spaces without being installed in a raceway. They shall be part of one of the following:

(1) Listed equipment

(2) A driving machine

(3) A driving machine brake

Δ **(4) Counterweight.** The following wiring methods shall be permitted on the counterweight assembly in lengths not to exceed 1.8 m (6 ft):

(1) Flexible metal conduit

(2) Liquidtight flexible metal conduit

(3) Liquidtight flexible nonmetallic conduit

(4) Flexible cords and cables, or conductors grouped together and taped or corded, shall be permitted to be installed without a raceway. They shall be located to be protected from physical damage, shall be of a flame-retardant type, and shall be part of one of the following:

a. Listed equipment

b. A driving machine

c. A driving machine brake

(B) Escalators.

(1) Wiring Methods. Flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit shall be permitted in escalator and moving walk wellways. Flexible metal conduit or liquidtight flexible conduit of metric designator 12 (trade size 3/8) shall be permitted in lengths not in excess of 1.8 m (6 ft).

Exception: Metric designator 12 (trade size 3/8), nominal, or larger liquidtight flexible nonmetallic conduit, as defined in 356.2(2), shall be permitted to be installed in lengths in excess of 1.8 m (6 ft).

(2) Class 2 Circuit Cables. Cables used in Class 2 power-limited circuits shall be permitted to be installed within escalators and moving walkways, provided the cables are ((~~supported~~)) installed in a raceway for protection ((~~and protected~~))from physical damage and the cables are of a jacketed and flame-retardant type.

(3) Flexible Cords. Hard-service cords that conform to the requirements of Article 400 (Table 400.4) shall be permitted as flexible connections on escalators and moving walk control panels and disconnecting means where the entire control panel and disconnecting means are arranged for removal from machine spaces as permitted in 620.5.

(C) Platform Lifts and Stairway Chairlift Raceways.

(1) Wiring Methods. Flexible metal conduit or liquidtight flexible metal conduit shall be permitted in platform lifts and stairway chairlift runways and machinery spaces. Flexible metal conduit or liquidtight flexible conduit of metric designator 12 (trade size 3/8) shall be permitted in lengths not in excess of 1.8 m (6 ft).

Exception: Metric designator 12 (trade size 3/8) or larger liquidtight flexible nonmetallic conduit, as defined in 356.2(2), shall be permitted to be installed in lengths in excess of 1.8 m (6 ft).

(2) Class 2 Circuit Cables. ((~~Cables~~)) Traveling cables used in Class 2 power-limited circuits shall be permitted to be installed within platform lifts and stairway chairlift runways and machinery spaces, provided the cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.

(3) Flexible Cords and Cables. Flexible cords and cables that are components of listed equipment and used in circuits operating at 30 volts rms or less or 42 volts dc or less shall be permitted in lengths not to exceed 1.8 m (6 ft), provided the cords and cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.

620.26 Panel Boards. All branch circuits required by 620.22, 620.23, and 620.25 shall originate from a panel board in the elevator machine room or control room.

Exception 1: A separate branch circuit for pit lighting and receptacle shall be allowed in accordance with 620.24 from other than in the elevator machine room or control room.

Exception 2: Private residence elevators are exempt from this ordinance.

620.27 Prohibited Equipment in Elevator Machine Room or Control Room. Any electrical equipment on the line side of the panel board required in 620.26 or elevator disconnecting means shall be prohibited from the elevator machine room or the control room. This equipment shall be permitted to be installed only by special permission of the authority having jurisdiction.

Exception: Transformers 30 kva or less supplying associated elevator or machine/control room loads and subject to the following:

1. Required elevator machine/control room electrical clearances shall be maintained.
2. The added heat load of the transformer shall be considered for machine/control room heating and cooling and ventilation. The BTUs of the transformer and the elevator equipment manufacturer shall be included in the HVAC calculation for the elevator machine/control room to ensure safe and normal operation of the elevator.
3. The heat output of the transformer in BTUs shall be posted in a visible location on the transformer.

620.44 Installation of Traveling Cables. Traveling cables that are suitably supported and protected from physical damage shall be permitted to be run without the use of a raceway in either or both of the following:

(1) When used inside the hoistway, on the elevator car, hoistway wall, counterweight, or controllers and machinery that are located inside the hoistway, provided the cables are in the original sheath.

(2) From inside the hoistway, to elevator controller enclosures and to elevator car and machine room, control room, machinery space, and control space connections that are located outside the hoistway for a distance not exceeding 1.8 m (6 ft) in length as measured from the first point of support on the elevator car or hoistway wall, or counterweight where applicable, provided the conductors are ((~~grouped together and taped or corded, or~~)) in the original sheath. These traveling cables shall be permitted to be continued to this equipment.

620.51 Disconnecting Means. A single means for disconnecting all ungrounded main power supply conductors for each elevator, dumbwaiter, escalator, moving walk, platform lift, or stairway chairlift shall be provided and be designed so that no pole can be operated independently. Where multiple driving machines are connected to a single elevator, escalator, moving walk, or pumping unit, there shall be one disconnecting means to disconnect the motor(s) and control valve operating magnets.

The disconnecting means for the main power supply conductors shall not disconnect the branch circuits required in 620.22, 620.23, and 620.24.

Δ **(A) Type.** The disconnecting means shall be an enclosed externally operable fused motor circuit switch or circuit breaker that is lockable only in the open position in accordance with 110.25.

The disconnecting means shall be a listed device.

Informational Note: For additional information, see ASME A17.1-2016/CSA B44-16, *Safety Code for Elevators and Escalators*.

Exception No. 1: Where an individual branch circuit supplies a platform lift, the disconnecting means required by 620.51(C)(4) shall be permitted to comply with 430.109(C). This disconnecting means shall be listed and shall be lockable open in accordance with 110.25.

Exception No. 2: Where an individual branch circuit supplies a stairway chairlift located within a dwelling unit, the stairway chairlift shall be permitted to be cord-and-plug-connected, provided it complies with 422.16(A) and the cord does not exceed 1.8 m (6 ft) in length.

(B) Operation. No provision shall be made to open or close this disconnecting means from any other part of the premises. If sprinklers are installed in hoistways, machine rooms, control rooms, machinery spaces, or control spaces, the disconnecting means shall be permitted to automatically open the power supply to the affected elevator(s) prior to the application of water. No provision shall be made to automatically close this disconnecting means. Power shall only be restored by manual means.

Informational Note: To reduce hazards associated with water on live elevator electrical equipment.

(C) Location. The disconnecting means shall be located where it is readily accessible to qualified persons.

(1) On Elevators Without Generator Field Control. On elevators without generator field control, the disconnecting means shall be located within sight of the motor controller. Where the motor controller is located in the elevator hoistway, the disconnecting means required by 620.51(A) shall be located outside the hoistway and accessible to qualified persons only. An additional fused or non-fused, enclosed, externally operable motor-circuit switch that is lockable open in accordance with 110.25 to disconnect all ungrounded main power-supply conductors shall be located within sight of the motor controller. The additional switch shall be a listed device and shall comply with 620.91(C).

Driving machines or motion and operation controllers not within sight of the disconnecting means shall be provided with a manually operated switch installed in the control circuit to prevent starting. The manually operated switch(es) shall be installed adjacent to this equipment.

Where the driving machine of an electric elevator or the hydraulic machine of a hydraulic elevator is located in a remote machine room or remote machinery space, a single means for disconnecting all ungrounded main power-supply conductors shall be provided and be lockable open in accordance with 110.25.

(2) On Elevators with Generator Field Control. On elevators with generator field control, the disconnecting means shall be located within sight of the motor controller for the driving motor of the motor-generator set. Driving machines, motor-generator sets, or motion and operation controllers not within sight of the disconnecting means shall be provided with a manually operated switch installed in the control circuit to prevent starting. The manually operated switch(es) shall be installed adjacent to this equipment.

Where the driving machine or the motor-generator set is located in a remote machine room or remote machinery space, a single means for disconnecting all ungrounded main power-supply conductors shall be provided and be lockable open in accordance with 110.25.

(3) On Escalators and Moving Walks. On escalators and moving walks, the disconnecting means shall be installed in the space where the controller is located.

(4) On Platform Lifts and Stairway Chairlifts. On platform lifts and stairway chairlifts, the disconnecting means shall be located within sight of the motor controller.

Δ **(D) Identification and Signs.**

(1) More than One Driving Machine. Where there is more than one driving machine in a machine room, the disconnecting means shall be numbered to correspond to the identifying number of the driving machine that they control.

The disconnecting means shall be provided with a sign to identify the location of the supply side overcurrent protective device.

(2) Available Fault Current Field Marking. Where an elevator control panel is used, it shall be legibly marked in the field with the available fault current at its line terminals. The field marking(s) shall include the date the available fault current calculation was performed and be of sufficient durability to withstand the environment involved.

When modifications to the electrical installation occur that affect the available fault current at the elevator control panel, the available fault current shall be verified or recalculated as necessary to ensure the elevator control panel's short-circuit current rating is sufficient for the available fault current at the line terminals of the equipment. The required field marking(s) shall be adjusted to reflect the new level of available fault current.

(E) Surge Protection. Where any of the disconnecting means in 620.51 has been designated as supplying an emergency system load, a legally required system load, or a critical operation power system load, listed surge protection shall be provided.

(F) Automatic Power Disconnect Device Control Circuit. The control circuit for a required automatic power disconnect device or shunt trip shall be derived either from:

(1) Within the disconnecting means enclosure when the shunt trip circuit equipment is a part of the listed assembly and the control-circuit controls only the disconnect(s) within the listed equipment; or

(2) A dedicated circuit from an appropriate panelboard located in the machine room.

(G) Prohibited Equipment in Elevator Machine room or Control Room. Any electrical equipment on the line side of the disconnecting means and control shall be prohibited from the elevator machine room or control room. This equipment shall be permitted to be installed only by prior permission of the authority having jurisdiction.

Exception: Transformers 30 kVA or less supplying associated elevator or machine/control room loads and subject to the following:
1. Required elevator machine/control room electrical clearances shall be maintained.
2. The added heat load of the transformer shall be considered for machine/control room heating and cooling and ventilation.

Δ **620.53 Car Light, Receptacle(s), and Ventilation Disconnecting Means.** Elevators shall have a single means for disconnecting all ungrounded car light, receptacle(s), and ventilation power-supply conductors for that elevator car.

The disconnecting means shall be an enclosed, externally operable, fused motor-circuit switch or circuit breaker that is lockable open in accordance with 110.25 and shall be located in the machine room or control room for that elevator car. ((~~Where there is no machine room or control room outside the hoistway, the disconnecting means shall be located outside the hoistway and accessible to qualified persons only.~~))

Disconnecting means shall be numbered to correspond to the identifying number of the elevator car whose light source they control.

The disconnecting means shall be provided with a sign to identify the location of the supply side overcurrent protective device.

Exception: Where a separate branch circuit supplies car lighting, a receptacle(s), and a ventilation motor not exceeding 2 hp, the disconnecting means required by 620.53 shall be permitted to comply with 430.109(C). This disconnecting means shall be listed and shall be lockable open in accordance with 110.25.

620.62 Selective Coordination. Where more than one driving machine disconnecting means is supplied by the same source, the overcurrent protective devices in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective devices.

Selective coordination shall be selected by a licensed professional engineer or other qualified person engaged primarily in the design, installation, or maintenance of electrical systems. The selection and device settings shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

Exception No. 1: Selective coordination shall not be required between transformer primary and secondary overcurrent protective devices where only one overcurrent device or set of overcurrent devices exists on the transformer secondary.

Exception No. 2: Selective coordination shall not be required between overcurrent protective devices of the same rating located in series where no loads are connected in parallel with the downstream device.

Exception 3: When an electrical engineer provides stamped fault current calculations, the overcurrent protective devices in each disconnecting means may be selectively coordinated with any other supply side overcurrent protective devices for faults with a duration of 0.1 seconds and longer.

Part VIII. Machine Rooms, Control Rooms, Machinery Spaces, and Control Spaces

620.71 ((~~Guarding~~)) Securing Equipment. Elevator, dumbwaiter, escalator, and moving walk driving machines; motor-generator sets; motor controllers; and disconnecting means shall be installed in a room or space set aside for that purpose unless otherwise permitted in 620.71(A) or (B). The room or space shall be secured against unauthorized access.

Exception: Elevator motor controllers may be installed, with permission of the authority having jurisdiction, in a hoistway.

Informational Note: Non-elevator equipment, wiring, pipes, and other materials are prohibited in elevator hoistways, pits, machine rooms and spaces. Only such equipment and wiring that pertain to the elevator and its operation are permitted in these elevator spaces. See Chapter 30 of the *Seattle Building Code*.

(A) Motor Controllers. ((~~Motor controllers shall be permitted outside the spaces herein specified, provided they are in enclosures with doors or removable panels that are capable of being locked in the closed position and the disconnecting means is located adjacent to or is an integral part of the motor controller.~~)) Motor controller enclosures for escalator or moving walks shall be permitted in the balustrade on the side located away from the moving steps or moving treadway. If the disconnecting means is an integral part of the motor controller, it shall be operable without opening the enclosure.

(B) Driving Machines. Elevators with driving machines located on the car, on the counterweight, or in the hoistway, and driving machines for dumbwaiters, platform lifts, and stairway lifts, shall be permitted outside the spaces herein specified.

620.91 Emergency and Standby Power Systems. ((~~Elevators shall be permitted to be powered by an emergency or standby power system.~~)) Elevator power system requirements are determined by the Seattle Building Code.

Informational Note No. 1: See ASME A17.1-2016/CSA B44-16, *Safety Code for Elevators and Escalators*, 2.27.2, for additional information.

Informational Note No. 2: See Chapter 7 of the *Seattle Building Code* for requirements to pressurize elevator hoistways and elevator lobbies.

Informational Note No. 3: See Chapter 10 of the *Seattle Building Code* for requirements for elevators serving as an accessible means of egress component (in buildings that have a required accessible floor that is four or more stories above or below the level of exit discharge) and for pressurization of elevator lobbies used as an area of refuge.

Informational Note No. 4: When an elevator is classified as a fire service access elevator or occupant evacuation operation elevator, some building codes require the elevator equipment, elevator hoistway lighting, ventilation and cooling equipment for elevator machine rooms, control rooms, machine spaces, and control spaces as well as elevator car lighting to be supplied by standby power systems in compliance with Article 701.

(A) Regenerative Power. For elevator systems that regenerate power back into the power source that is unable to absorb the regenerative power under overhauling elevator conditions, a means shall load be provided to absorb this power.

(B) Other Building Loads. Other building loads, such as power and lighting, shall be permitted as the energy absorption means required in 620.91(A), provided that such loads are automatically connected to the emergency or standby power system operating the elevators and are large enough to absorb the elevator regenerative power.

(C) Disconnecting Means. The disconnecting means required by 620.51 shall disconnect the elevator from both the emergency or standby power system and the normal power system.

Where an additional power source is connected to the load side of the disconnecting means, which allows automatic movement of the car to permit evacuation of passengers, the disconnecting means required in 620.51 shall be provided with an auxiliary contact that is positively opened mechanically, and the opening shall not be solely dependent on springs. This contact shall cause the additional power source to be disconnected from its load when the disconnecting means is in the open position.

ARTICLE 625
Electric Vehicle Charging System

625.27 Requirements for Electrical Vehicle Charging Outlets. New parking spaces provided on a lot when a new building is constructed shall be "EV-ready" as specified in 625.27 (A) or (B). When calculating the number of required EV-ready parking spaces, any fraction or portion of an EV-ready parking space required shall be rounded up to the nearest whole number.

Exception: The Director may, in consultation with the Director of Seattle City Light, reduce the requirements of this section where there is substantial evidence substantiating that the added electrical load that can be attributed to meeting these requirements will alter the local utility infrastructure design requirements on the utility side of the legal point of service, so as to require on-property power transformation; or require an upgrade to an existing residential electrical service. In these cases, the maximum quantity of EV charging infrastructure required to be installed shall be reduced to the maximum service size that would not require changes to transformation or existing electrical service capacity. The Director may first reduce the required level of EV infrastructure at EV-ready parking spaces from 40-amp to 20-amp circuits. If necessary, the Director may also then reduce the number of required EV-ready parking spaces or otherwise reduce the level of EV infrastructure at EV-ready parking spaces.

(A) Residential uses:

(1) When parking for any individual dwelling unit is provided in a private garage, carport, or parking area, separate from any parking facilities serving other units, at least one parking space in that garage, carport, or parking area shall be EV-ready.

(2) When parking for multifamily residential uses is provided in a surface parking area serving multiple residences, the number of parking spaces that shall be EV-ready shall be as follows:

(a) When between one and six parking spaces are provided, each of those parking spaces shall be EV-ready.

(b) When between seven and 25 parking spaces are provided, a minimum of six of those parking spaces shall be EV-ready

(c) When more than 25 parking spaces are provided, a minimum of 20 percent of those parking spaces shall be EV-ready.

(3) When parking for multifamily residential uses is provided in a parking garage serving multiple residences, a minimum of 20 percent of those parking spaces shall be EV-ready.

(4) When parking is provided for all other residential uses, a minimum of 20 percent of those spaces shall be EV-ready.

(B) Nonresidential uses: When parking is provided for nonresidential uses, a minimum of ten percent of those spaces shall be EV-ready

Informational note: Circuit breakers marked "line" and "load" may not be suitable for backfed or reverse current.

ARTICLE 645
Information Technology Equipment

645.27 Selective Coordination. Critical operations data system(s) overcurrent protective devices shall be selectively coordinated with all supply-side overcurrent protective devices.

Selective coordination shall be selected by a licensed professional engineer or other qualified persons engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

Exception: When an electrical engineer provides stamped fault current calculations, the overcurrent protective devices in each disconnecting means may be selectively coordinated with any other supply side overcurrent protective devices for faults with a duration of 0.1 seconds and longer.

ARTICLE 680
Swimming Pools, Fountains, and Similar Installations

680.73 Accessibility. Hydromassage bathtub electrical equipment shall be accessible without damaging the building structure or building finish. Where the hydromassage bathtub is cord- and plug-connected with the supply receptacle accessible only through a service access opening, the receptacle shall be installed so that its face is within direct view and not more than 300 mm (1 ft) of the opening.

The ground fault circuit interrupter device must be identified as to use and not located in a building or tub cavity, crawlspace, or attic.

All electrical equipment installed to support the bathtub (e.g., disconnecting means, motor, etc.) must be accessible at the same grade level as the tub or from a landing on the exterior of the building without the use of a ladder or other access device.

Informational Note: WAC 296-46B-680, requirements for special equipment such as swimming pools, fountains, and similar installations, is incorporated herein with edits.

ARTICLE 690
Solar Photovoltaic (PV) Systems

690.1 Scope. This article applies to solar PV systems, other than those covered by Article 691, including the array circuit(s), inverter(s), and controller(s) for such systems. The systems covered by this article include those interactive with other electric power production sources or stand-alone, or both. These PV systems may have ac or dc output for utilization.

Informational Note No. 1 ((~~See Informational Note Figure 690.1(a) and Informational Note Figure 690.1(b)~~)). *See Section 80.51(B)(1)(h) of this code for inspection and plan review requirements when installing PV systems.*

Informational Note No. 2: Article 691 covers the installation of large-scale PV electric supply stations.

690.13 Photovoltaic System Disconnecting Means. Means shall be provided to disconnect the PV system from all wiring systems including power systems, energy storage systems, and utilization equipment and its associated premises wiring.

(A) Location. The PV system disconnecting means shall be installed at a readily accessible location. Where disconnecting means of systems above 30 V are readily accessible to unqualified persons, any enclosure door or hinged cover that exposes live parts when open shall be locked or require a tool to open.

Informational Note: PV systems installed in accordance with 690.12 address the concerns related to energized conductors entering a building.

(B) Marking. Each PV system disconnecting means shall plainly indicate whether in the open (off) or closed (on) position and be permanently marked "PV SYSTEM DISCONNECT" or equivalent. Additional markings shall be permitted based upon the specific system configuration. For PV system disconnecting means where the line and load terminals may be energized in the open position, the device shall be marked with the following words or equivalent:

WARNING

ELECTRIC SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY BE
ENERGIZED IN THE OPEN POSITION

The warning sign(s) or label(s) shall comply with 110.21(B).

(C) Maximum Number of Disconnects. Each PV system disconnecting means shall consist of not more than six switches or six sets of circuit breakers, or a combination of not more than six switches and sets of circuit breakers, mounted in a single enclosure, or in a group of separate enclosures. A single PV system disconnecting means shall be permitted for the combined ac output of one or more inverters or ac modules in an interactive system.

Informational Note: This requirement does not limit the number of PV systems connected to a service as permitted in 690.4(D). This requirement allows up to six disconnecting means to disconnect a single PV system. For PV systems where all power is converted through interactive inverters, a dedicated circuit breaker, in 705.12(B)(1), is an example of a single PV system disconnecting means.

(D) Ratings. The PV system disconnecting means shall have ratings sufficient for the maximum circuit current, available fault current, and voltage that is available at the terminals of the PV system disconnect.

(E) Type of Disconnect. The PV system disconnecting means shall simultaneously disconnect the PV system conductors that are not solidly grounded from all conductors of other wiring systems. The PV system disconnecting means or its remote operating device or the enclosure providing access to the disconnecting means shall be capable of being locked in accordance with 110.25. The PV system disconnecting means shall be one of the following:

(1) A manually operable switch or circuit breaker.

(2) A connector meeting the requirements of 690.33(D)(1) or (D)(5).

(3) A pull-out switch with the required interrupting rating

(4) A remote-controlled switch or circuit breaker that is operable locally and opens automatically when control power is interrupted.

(5) A device listed or approved for the intended application.

Informational Note: Circuit breakers marked "line" and "load" may not be suitable for backfed or reverse current.

Where the PV system is interactive with other electric power production source(s), and the disconnect is a knife switch, then the PV system disconnect shall be of the heavy-duty type and shall comply with the requirements of 404.13(E) and 705.20.

695.3 Power Source(s) for Electric Motor-Driven Fire Pumps. Electric motor-driven fire pumps shall have a reliable source of power.

Informational Note: See Sections 9.3.2 and A.9.3.2 from NFPA 20-2019, *Standard for the Installation of Stationary Pumps for Fire Protection*, for guidance on the determination of power source reliability.

(A) Individual Sources. Where reliable, and where capable of carrying indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply, the power source for an electric motor driven fire pump shall be one or more of the following.

(1) Electric Utility Service Connection. A fire pump shall be permitted to be supplied by a separate service, or from a connection located ahead of and not within the same cabinet, enclosure, vertical switchgear section, or vertical switchboard section as the service disconnecting means. The connection shall be located and arranged so as to minimize the possibility of damage by fire from within the premises and from exposing hazards. A tap ahead of the service disconnecting means shall comply with 230.82(5). The service equipment shall comply with the labeling requirements in 230.2 and the location requirements in 230.72(B). [**20:**9.2.2(1)]

(2) On-Site Power Production Facility. A fire pump shall be permitted to be supplied by an on-site power production facility. The source facility shall be located and protected to minimize the possibility of damage by fire. [**20:**9.2.2(3)]

(3) Dedicated Feeder. A dedicated feeder shall be permitted where it is derived from a service connection as described in 695.3(A)(1). [**20:**9.2.2(3)]

(B) Multiple Sources. If reliable power cannot be obtained from a source described in 695.3(A), power shall be supplied by one of the following: [**20:**9.3.2]

(1) Individual Sources. An approved combination of two or more of the sources from 695.3(A).

Δ **(2) Individual Source and On-site Standby Generator.** An approved combination of one or more of the sources in 695.3(A) and an on-site standby generator complying with 695.3(D). [**20:**9.3.4]

Exception to 695.3(B)(1) and (B)(2): An alternate source of power shall not be required where a back-up engine-driven fire pump, back-up steam turbine-driven fire pump , or back-up electric motor-driven fire pump with an independent power source in accordance with 695.3(A) or (C) is installed.

Δ **(C) Multibuilding Campus-Style Complexes.** If the sources in 695.3(A) are not practicable and the installation is part of a multibuilding campus-style complex, feeder sources shall be permitted if approved by the authority having jurisdiction and installed in accordance with either 695.3(C)(1) and (C)(3) or (C)(2) and (C)(3).

(1) Feeder Sources. Two or more feeders shall be permitted as more than one power source if such feeders are connected to, or derived from, separate utility services. The connection(s), overcurrent protective device(s), and disconnecting means for such feeders shall meet the requirements of 695.4(B)(1)(b).

(2) Feeder and Alternate Source. A feeder shall be permitted as a normal source of power if an alternate source of power independent from the feeder is provided. The connection(s), overcurrent protective device(s), and disconnecting means for such feeders shall meet the requirements of 695.4(B)(1)(b).

Δ **(3) Selective Coordination.** Overcurrent protective device(s) shall be selectively coordinated with all supply-side overcurrent protective device(s).

Selective coordination shall be selected by a licensed professional engineer or other qualified persons engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those authorized to design, install, maintain, and operate the system.

Exception 1: Selective coordination shall not be required between two overcurrent devices located in series if no loads are connected in parallel with the downstream device.

Exception 2: When an electrical engineer provides stamped fault current calculations, the overcurrent protective devices in each disconnecting means may be selectively coordinated with any other supply side overcurrent protective devices for faults with a duration of 0.1 seconds and longer.

Δ **(D) On-Site Standby Generator as Alternate Source.** An on-site standby generator(s) used as an alternate source of power shall comply with 695.3(D)(1) through (D)(3). [**20:**9.6.2.1]

(1) **Capacity.** The generator shall have sufficient capacity to allow normal starting and running of the motor(s) driving the fire pump(s) while supplying all other simultaneously operated load(s). [**20:**9.6.1.1]

Automatic shedding of one or more optional standby loads in order to comply with this capacity requirement shall be permitted.

(2) **Connection.** A tap ahead of the generator disconnecting means shall not be required. [**20:**9.6.1.2]

(3) **Adjacent Disconnects.** The requirements of 430.113 shall not apply.

(E) Arrangement. All power supplies shall be located and arranged to protect against damage by fire from within the premises and exposing hazards. [**20:**9.1.4]

Multiple power sources shall be arranged so that a fire at one source does not cause an interruption at the other source.

(F) Transfer of Power. Transfer of power to the fire pump controller between the individual source and one alternate source shall take place within the pump room. [**20:**9.6.4]

(G) Power Source Selection. Selection of power source shall be performed by a transfer switch listed for fire pump service. [**20:**10.8.1.3.1]

(H) Overcurrent Device Selection. An instantaneous trip circuit breaker shall be permitted in lieu of the overcurrent devices specified in 695.4(B)(2)(a)(1), provided that it is part of a transfer switch assembly listed for fire pump service that complies with 695.4(B)(2)(a)(2).

(I) Phase Converters. Phase converters shall not be permitted to be used for fire pump service. [**20:**9.1.7]

ARTICLE 700
Emergency Systems

Δ **700.1 Scope.** This article applies to the electrical safety of the installation, operation, and maintenance of emergency systems consisting of circuits and equipment intended to supply, distribute, and control electricity for illumination, power, or both, to required facilities when the normal electrical supply or system is interrupted.

Informational Note No. 1: For further information regarding wiring and installation of emergency systems in health care facilities, see Article 517.

Informational Note No. 2: For further information regarding performance and maintenance of emergency systems in health care facilities, see NFPA 99-2018, *Health Care Facilities Code.*

Informational Note No. 3: For specification of locations where emergency lighting is considered essential to life safety, see NFPA *101*-2018, *Life Safety Code.*

Informational Note No. 4: For further information regarding performance of emergency and standby power systems, see NFPA 110-2019, *Standard for Emergency and Standby Power Systems*.

Informational Note No. 5: See *Seattle Building Code* Chapter 27 and *NFPA 110 and 111* for standards related to emergency power systems for additional installation requirements.

Informational Note No. 6: See Chapter 10 of the *Seattle Building Code* for means of egress illumination and identification requirements.

Informational Note No. 7: See DPD Client Assistance Memo (TIP 339), *Emergency and Standby Power Systems*, for additional information.

700.3 Tests and Maintenance.

(A) Conduct or Witness Test. The authority having jurisdiction shall conduct or witness a test of the complete system upon installation and periodically afterward under the control of the Seattle Fire Department.

(B) Tested Periodically. Systems shall be tested periodically by the building owner or manager on a schedule approved by the authority having jurisdiction to ensure the systems are maintained in proper operating condition.

(C) Maintenance. Emergency system equipment shall be maintained in accordance with manufacturer instructions and industry standards.

(D) Written Record. A written record shall be kept of such tests and maintenance.

(E) Testing Under Load. Means for testing all emergency lighting and power systems during maximum anticipated load conditions shall be provided.

Informational Note: For information on testing and maintenance of emergency power supply systems (EPSSs), see NFPA 110-2019, *Standard for Emergency and Standby Power Systems*.

Δ **(F) Temporary Source of Power for Maintenance or Repair of the Alternate Source of Power.** If the emergency system relies on a single alternate source of power, which will be disabled for maintenance or repair, the emergency system shall include permanent switching means to connect a portable or temporary alternate source of power, which shall be available for the duration of the maintenance or repair. The permanent switching means to connect a portable or temporary alternate source of power shall comply with the following:

(1) Connection to the portable or temporary alternate source of power shall not require modification of the permanent system wiring.

(2) Transfer of power between the normal power source and the emergency power source shall be in accordance with 700.12.

(3) The connection point for the portable or temporary alternate source shall be marked with the phase rotation and system bonding requirements.

(4) Mechanical or electrical interlocking shall prevent inadvertent interconnection of power sources.

(5) The switching means shall include a contact point that shall annunciate at a location remote from the generator or at another facility monitoring system to indicate that the permanent emergency source is disconnected from the emergency system.

(6) Over-current protection shall be provided for conductors from where they enter the building to the emergency system. See Section 225.32 for location information.

It shall be permissible to utilize manual switching to switch from the permanent source of power to the portable or temporary alternate source of power and to utilize the switching means for connection of a load bank.

Informational Note: There are many possible methods to achieve the requirements of 700.3(F). See Informational Note Figure 700.3(F) for one example.

Exception: The permanent switching means to connect a portable or temporary alternate source of power, for the duration of the maintenance or repair, shall not be required where any of the following conditions exists:

(1) All processes that rely on the emergency system source are capable of being disabled during maintenance or repair of the emergency source of power.
(2) The building or structure is unoccupied and fire protection systems are fully functional and do not require an alternate power source.
(3) Other temporary means can be substituted for the emergency system.
(4) A permanent alternate emergency source, such as, but not limited to, a second on-site standby generator or separate electric utility service connection, capable of supporting the emergency system, exists.

700.7 Signs.

(A) Emergency Sources. A sign shall be placed at the service-entrance equipment, indicating type and location of each on-site emergency power source.

Sign(s) must be placed at the service disconnecting means and the meter base if the services disconnecting means and meter base are not located within sight and within 5 ft of each other.

Exception: A sign shall not be required for individual unit equipment as specified in 700.12(F).

Informational Note: WAC 296-46B-700.007(2), requirements for sign placement, is incorporated herein.

(B) Grounding. Where removal of a grounding or bonding connection in normal power source equipment interrupts the grounding electrode conductor connection to the alternate power source(s) grounded conductor, a warning sign shall be installed at the normal power source equipment stating:

WARNING
SHOCK HAZARD EXISTS IF GROUNDING ELECTRODE CONDUCTOR OR BONDING JUMPER CONNECTION IN THIS EQUIPMENT IS REMOVED WHILE ALTERNATE SOURCE(S) IS ENERGIZED.

The warning sign(s) or label(s) shall comply with 110.21(B).

700.10 Wiring, Emergency System.

(A) Identification. ((~~Emergency circuits shall be permanently marked so they will be readily identified as a component of an emergency circuit or system by the following methods:~~)) All exit and emergency lights, whether or not required by this *Code*, must be installed in accordance with Article 700.

(1) All boxes and enclosures (including transfer switches, generators, and power panels) for emergency circuits shall be permanently marked as a component of an emergency circuit or system so they will be readily identified as a component of an emergency circuit or system.

All boxes and enclosures, for Article 700 systems, larger than 6 in. by 6 in., including transfer switches, generators, and power panels for emergency systems and circuits, must be permanently identified with an identification plate that is substantially orange in color.

Exception: In existing health care facilities, the existing nameplate identification color scheme can be retained for transfer switches, generators, and power panels for existing emergency systems that are not being replaced or modified. All other device and junction boxes for emergency systems and circuits must be substantially orange in color, both inside and outside.

Informational Note: WAC 296-46B-700.009(3) and (4), requirements for emergency and exit lights, and identification plates, are incorporated herein.

(2) Where boxes or enclosures are not encountered, exposed cable or raceway systems shall be permanently marked to be identified as a component of an emergency circuit or system, at intervals not to exceed 7.6 m (25 ft).

Receptacles supplied from the emergency system shall have a distinctive color or marking on the receptacle cover plates or the receptacles.

(B) Wiring. Wiring from an emergency source or emergency source distribution overcurrent protection to emergency loads shall be kept entirely independent of all other wiring and equipment unless otherwise permitted in 700.10(B)(1) through (B)(5):

(1) Wiring from the normal power source located in transfer equipment enclosures

(2) Wiring supplied from two sources in exit or emergency luminaires

(3) Wiring from two sources in a listed load control relay supplying exit or emergency luminaires, or in a common junction box, attached to exit or emergency luminaires

(4) Wiring within a common junction box attached to unit equipment, containing only the branch circuit supplying the unit equipment and the emergency circuit supplied by the unit equipment

(5) Wiring from an emergency source to supply emergency and other (nonemergency) loads in accordance with 700.10(B)(5)a., (B)(5)b., (B)(5)c., and (B)(5)d. as follows:

a. Separate vertical switchgear sections or separate vertical switchboard sections, with or without a common bus, or individual disconnects mounted in separate enclosures shall be used to separate emergency loads from all other loads.

b. The common bus of separate sections of the switchgear, separate sections of the switchboard, or the individual enclosures shall be either of the following:

(i) Supplied by single or multiple feeders without overcurrent protection at the source

(ii) Supplied by single or multiple feeders with overcurrent protection, provided that the overcurrent protection that is common to an emergency system and any nonemergency system(s) is selectively coordinated with the next downstream overcurrent protective device in the nonemergency system(s)

Informational Note: For further information, see Informational Note Figure 700.10(B)(a) and Informational Note Figure 700.10(B)(b).

Wiring of two or more emergency circuits supplied from the same source shall be permitted in the same raceway, cable, box, or cabinet.

(C) Wiring Design and Location. Emergency wiring circuits shall be designed and located so as to minimize the hazards that might cause failure due to flooding, fire, icing, vandalism, and other adverse conditions.

Δ **(D) Fire Protection.**

N **(1) Occupancies.** Emergency systems shall meet the additional requirements in 700.10(D)(2) through (D)(4) in the following occupancies:

(1) Assembly occupancies for not less than 1000 persons

(2) Buildings above 23 m (75 ft) in height

(3) Educational occupancies with more than 300 occupants

Δ **(2) Feeder-Circuit Wiring.** Feeder-circuit wiring shall meet one of the following conditions:

(1) The cable or raceway is installed in spaces or areas that are fully protected by an approved automatic fire protection system.

Informational Note: In buildings having *Seattle Building Code* Type I or II construction, wiring located above sprinkler heads, including wiring separated from sprinkler heads by a drop-ceiling system, is considered fully protected as required by this section.

(2) The cable or raceway is protected by a listed electrical circuit protective system with a minimum 2-hour fire rating.

Informational Note No. 1: Electrical circuit protective systems could include but not be limited to thermal barriers or a protective shaft and are tested to UL 1724, *Fire Tests for Electrical Circuit Protection Systems*.

Informational Note No. 2: The listing organization provides information for electrical circuit protective systems on proper installation requirements to maintain the fire rating.

(3) The cable or raceway is a listed fire-resistive cable system with a minimum 2-hour fire rating.

Informational Note No. 1: Fire-resistive cables are tested to ANSI/UL 2196-2017, *Standard for Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables*.

Informational Note No. 2: The listing organization provides information for fire-resistive cable systems on proper installation requirements to maintain the fire rating.

(4) The cable or raceway is protected by a listed fire-rated assembly that has a minimum fire rating of 2 hours and contains only emergency circuits.

(5) The cable or raceway is encased in a minimum of 50 mm (2 in.) of concrete.

(3) Feeder-Circuit Equipment. Equipment for feeder circuits (including transfer switches, transformers, and panelboards) shall be located either in spaces fully protected by an approved automatic fire protection system or in spaces with a 2-hour fire resistance rating.

(4) Generator Control Wiring. Control conductors installed between the transfer equipment and the emergency generator shall be kept entirely independent of all other wiring and shall meet the conditions of 700.10(D)(2). The integrity of the generator remote start circuit shall be monitored for broken, disconnected, or shorted wires. Loss of integrity shall start the generator(s).

Δ **700.12 General Requirements.** Current supply shall be such that, in the event of failure of the normal supply to, or within, the building or group of buildings concerned, emergency lighting, emergency power, or both shall be available within the time required for the application but not to exceed 10 seconds. The supply system for emergency purposes, in addition to the normal services to the building and meeting the general requirements of this section, shall be one or more of the types of systems described in 700.12(C) through (H). Unit equipment in accordance with 700.12(I) shall satisfy the applicable requirements of this article.

N **(A) Power Source Considerations.** In selecting an emergency source of power, consideration shall be given to the occupancy and the type of service to be rendered, whether of minimum duration, as for evacuation of a theater, or longer duration, as for supplying emergency power and lighting due to an indefinite period of current failure from trouble either inside or outside the building.

N **(B) Equipment Design and Location.** Equipment shall be designed and located so as to minimize the hazards that might cause complete failure due to flooding, fires, icing, and vandalism.

Equipment for sources of power as described in 700.12(C) through (H) shall be installed either in spaces fully protected by approved automatic fire protection systems or in spaces with a 2-hour fire rating where located within the following:

(1) Assembly occupancies for more than 1000 persons

(2) Buildings above 23 m (75 ft) in height with any of the following occupancy classes — assembly, educational, residential, detention and correctional, business, and mercantile

(3) Educational occupancies with more than 300 occupants

Informational Note No. 1: For the definition of *Occupancy Classification*, see ((~~Section 6.1 of NFPA *101* 2018, *Life Safety*~~)) Chapter 3 of the *Seattle Building Code*.

Informational Note No. 2: For information regarding power system reliability, see IEEE 3006.5-2014, *Recommended Practice for the Use of Probability Methods for Conducting a Reliability Analysis of Industrial and Commercial Power Systems*.

(C) Storage Battery. Storage batteries shall be of suitable rating and capacity to supply and maintain the total load for a minimum period of 1 1/2 hours, without the voltage applied to the load falling below 87 1/2 percent of normal. Automotive-type batteries shall not be used.

An automatic battery charging means shall be provided.

(D) Generator Set.

Δ **(1) Prime Mover-Driven.** For a generator set driven by a prime mover approved by the authority having jurisdiction and sized in accordance with 700.4, means shall be provided for automatically starting the prime mover on failure of the normal service and for automatic transfer and operation of all required electrical circuits. A time-delay feature shall be provided to avoid retransfer in case of short-time reestablishment of the normal source.

Δ **(2) Internal Combustion Engines as Prime Movers.**

(a) *On-Site Fuel Supply.* Where internal combustion engines are used as the prime mover, an on-site fuel supply shall be provided with an on-premises fuel supply sufficient for not less than 2 hours' operation of the system.

(b) *Fuel Transfer Pumps.* Where power is needed for the operation of the fuel transfer pumps to deliver fuel to a generator set day tank, this pump shall be connected to the emergency power system.

(c) *Public Gas System, Municipal Water Supply.* Prime movers shall not be solely dependent on a public utility gas system for their fuel supply or municipal water supply for their cooling systems.

((~~Exception: Where approved by the authority having jurisdiction, the use of other than on-site fuels shall be permitted where there is a low probability of a simultaneous failure of both the off-site fuel delivery system and power from the outside electrical utility company.~~))

(d) *Automatic Fuel Transfer.* Where dual fuel supplies are used, means shall be provided for automatically transferring from one fuel supply to another.

(3) Battery Power and Dampers. Where a storage battery is used for control or signal power or as the means of starting the prime mover, it shall be suitable for the purpose and shall be equipped with an automatic charging means independent of the generator set. Where the battery charger is required for the operation of the generator set, it shall be connected to the emergency system. Where power is required for the operation of dampers used to ventilate the generator set, the dampers shall be connected to the emergency system.

(4) Auxiliary Power Supply. Generator sets that require more than 10 seconds to develop power shall be permitted if an auxiliary power supply energizes the emergency system until the generator can pick up the load.

(5) Outdoor Generator Sets. Where an outdoor-housed generator set is equipped with a readily accessible disconnecting means in accordance with 445.18, and the disconnecting means is located within sight of the building or structure supplied, an additional disconnecting means shall not be required where ungrounded conductors serve or pass through the building or structure. Where the generator supply conductors terminate at a disconnecting means in or on a building or structure, the disconnecting means shall meet the requirements of 225.36.

Exception: For installations under single management, where conditions of maintenance and supervision ensure that only qualified persons will monitor and service the installation and where documented safe switching procedures are established and maintained for disconnection, the generator set disconnecting means shall not be required to be located within sight of the building or structure served.

(E) Uninterruptible Power Supplies. Uninterruptible power supplies used to provide power for emergency systems shall comply with the applicable provisions of 700.12(B) and (C) and shall be listed for emergency use.

Informational Note: UL 924 *Emergency Lighting and Power Equipment* is the appropriate standard for emergency equipment.

(F) Separate Service. Where approved by the authority having jurisdiction as suitable for use as an emergency source of power, an additional service shall be permitted. This service shall be in accordance with the applicable provisions of Article 230 and the following additional requirements:

(1) Separate ((~~overhead service conductors,~~)) service drops, underground service conductors, or service laterals shall be installed.

(2) The service conductors for the separate service shall be installed sufficiently remote electrically and physically from any other service conductors to minimize the possibility of simultaneous interruption of supply.

(G) Fuel Cell System. Fuel cell systems used as a source of power for emergency systems shall be of suitable rating and capacity to supply and maintain the total load for not less than 2 hours of full-demand operation.

Installation of a fuel cell system shall meet the requirements of Parts II through VIII of Article 692.

Where a single fuel cell system serves as the normal supply for the building or group of buildings concerned, it shall not serve as the sole source of power for the emergency standby system.

N **(H) DC Microgrid Systems.** Sources connected to a dc microgrid system shall be permitted where the system is capable of being isolated from all non-emergency sources.

DC microgrid systems used as a source of power for emergency systems shall be of suitable rating and capacity to supply and maintain the total emergency load for not less than 2 hours of full-demand operation.

Where a dc microgrid system source serves as the normal supply for the building or group of buildings concerned, it shall not serve as the sole source of power for the emergency standby system.

(I) Unit Equipment.

(1) Components of Unit Equipment. Individual unit equipment for emergency illumination shall consist of the following:

(1) A rechargeable battery

(2) A battery charging means

(3) Provisions for one or more lamps mounted on the equipment, or shall be permitted to have terminals for remote lamps, or both

(4) A relaying device arranged to energize the lamps automatically upon failure of the supply to the unit equipment

Δ **(2) Installation of Unit Equipment.** Unit equipment shall be installed in accordance with the following:

(1) The batteries shall be of suitable rating and capacity to supply and maintain the total lamp load associated with the unit in accordance with the following:

a. For a period of at least 1 1/2 hours without the voltage falling below 87 1/2 percent of normal battery voltage.

b. The unit equipment shall supply and maintain not less than 60 percent of the initial emergency illumination for a period of at least 1 1/2 hours.

(2) Unit equipment shall be permanently fixed (i.e., not portable) in place and shall have all wiring to each unit installed in accordance with the requirements of any of the wiring methods in Chapter 3. Flexible cord-and-plug connection shall be permitted, provided that the cord does not exceed 900 mm (3 ft) in length.

(3) The branch circuit feeding the unit equipment shall be one of the following:

a. The same branch circuit as that serving the normal lighting in the area and connected ahead of any local switches

b. Where the normal lighting circuit is served by one or more branch circuits, a separate branch circuit, provided with a lock-on feature, that originates from the same panelboard as the normal lighting circuits. The branch circuit disconnecting means for this branch circuit shall be provided with a lock-on feature.

(4) The branch circuit that feeds unit equipment shall be clearly identified at the distribution panel.

(5) Emergency luminaires that obtain power from a unit equipment and are not part of the unit equipment shall be wired to the unit equipment as required by 700.10 and by one of the wiring methods of Chapter 3.

(6) Remote heads providing lighting for the exterior of an exit door shall be permitted to be supplied by the unit equipment serving the area immediately inside the exit door.

Δ 700.16 Emergency Illumination.

N **(A) General.** Emergency illumination shall include means of egress lighting, illuminated exit signs, and all other luminaires specified as necessary to provide required illumination.

N **(B) System Reliability.** Emergency lighting systems shall be designed and installed so that the failure of any illumination source cannot leave in total darkness any space that requires emergency illumination. Control devices in the emergency lighting system shall be listed for use in emergency systems. Listed unit equipment in accordance with 700.12(I) shall be considered as meeting the provisions of this section.

Informational Note: 700.23 through 700.26 provide requirements for applications of emergency system control devices.

N **(C) Discharge Lighting.** Where high-intensity discharge lighting such as high- and low-pressure sodium, mercury vapor, and metal halide is used as the sole source of normal illumination, the emergency lighting system shall be required to operate until normal illumination has been restored.

N **(D) Disconnecting Means.** Where an emergency system is installed, emergency illumination shall be provided in the area of the disconnecting means required by 225.31 and 230.70, as applicable, where the disconnecting means are installed indoors.

Exit signs with open bottom lighting shall not be used in lieu of a required pathway light unless specifically approved for the purpose.

Exit illumination (pathway lighting) and emergency area lighting shall comply with Chapter 10 of the *Seattle Building Code*.

Exception: Alternative means that ensure that the emergency lighting illumination level is maintained shall be permitted when preapproved by the authority having jurisdiction.

700.32 Selective Coordination. Emergency system(s) overcurrent devices shall be selectively coordinated with supply side overcurrent protective devices.

Selective coordination shall be selected by a licensed professional engineer or other qualified persons engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

Exception No. 1: Selective coordination shall not be required between two overcurrent devices located in series if no loads are connected in parallel with the downstream device.

Exception No. 2: When an electrical engineer provides stamped and signed time current curves, the emergency system(s) overcurrent protective devices may be selectively coordinated with emergency system supply side overcurrent protective devices for faults with a duration of 0.1 seconds and longer.

Informational Note: See Informational Note Figure 700.32 for an example of how emergency system overcurrent protective devices (OCPDs) selectively coordinate with all supply-side OCPDs.

OCPD D selectively coordinates with OCPDs C, F, E, B, and A.
OCPD C selectively coordinates with OCPDs F, E, B, and A.
OCPD F selectively coordinates with OCPD E.
OCPD B is not required to selectively coordinate with OCPD A because OCPD B is not an emergency system OCPD.

ARTICLE 701
Legally Required Standby Systems

Δ 701.4 Capacity and Rating.

N **(A) Rating.** Legally required standby system equipment shall be suitable for the available fault current at its terminals.

N **(B) Capacity.** A legally required standby system shall have adequate capacity in accordance with Article 220 or by another approved method.

N **(C) Load Pickup, Load Shedding, and Peak Load Shaving.** The alternate power source shall be permitted to supply legally required standby and optional standby system loads where the alternate source has adequate capacity or where automatic selective load pickup and load shedding are provided that will ensure adequate power to the legally required standby circuits.

Informational Note: Optional standby systems shall meet the requirements of Section 702.5 of this *Code* for Transfer Equipment.

701.6 Signals. Audible and visual signal devices shall be provided, where practicable, for the purposes described in 701.6(A), (B), (C), and (D).

(A) Malfunction. To indicate malfunction of the standby source.

(B) Carrying Load. To indicate that the standby source is carrying load.

(C) Not Functioning. To indicate that the battery charger is not functioning.

Informational Note: For signals for generator sets, see NFPA 110-2016, *Standard for Emergency and Standby Power Systems*.

(D) Ground Fault. To indicate a ground fault in solidly grounded wye, legally required standby systems of more than 150 volts to ground and circuit-protective devices rated 1,000 amperes or more. The sensor for the ground-fault signal devices shall be located at, or ahead of, the main system disconnecting means for the legally required standby source, and the maximum setting of the signal devices shall be for a ground-fault current of 1,200 amperes. Instructions on the course of action to be taken in event of indicated ground fault shall be located at or near the sensor location.

For systems with multiple emergency sources connected to a paralleling bus, the ground fault sensor shall be permitted at an alternate location.

Informational Note: For signals for generator sets, see NFPA 110-2019, *Standard for Emergency and Standby Power Systems.*

701.7 Signs.

(A) Mandated Standby. A sign shall be placed at the service entrance indicating type and location of each on-site legally required standby power source.

Sign(s) must be placed at the service disconnecting means and the meter base if the service disconnecting means and meter base are not located within sight and within 5 ft of each other.

Exception: A sign shall not be required for individual unit equipment as specified in 701.12(G).

Informational Note: WAC 296-46B-701.007(1) requirements for signage not located within sight is incorporated herein with edits.

(B) Grounding. Where removal of a grounding or bonding connection in normal power source equipment interrupts the grounding electrode conductor connection to the alternate power source(s) grounded conductor, a warning sign shall be installed at the normal power source equipment stating:

WARNING
SHOCK HAZARD EXISTS IF GROUNDING ELECTRODE CONDUCTOR OR BONDING JUMPER CONNECTION IN THIS EQUIPMENT IS REMOVED WHILE ALTERNATE SOURCE(S) IS ENERGIZED.

The warning sign(s) or label(s) shall comply with 110.21(B).

Part II. Circuit Wiring

701.10 Wiring Legally Required Standby Systems. The legally required standby system wiring shall be ((~~permitted to occupy~~)) kept entirely independent of all wiring and equipment and shall not enter the same raceways, cables, boxes, and cabinets with other general wiring ((~~.~~)) for the following systems:

(1) Shaft pressurization systems installed according to Chapter 9 of the *Seattle Building Code*, and

(2) Elevators serving as an accessible means of egress according to Chapter 10 of the *Seattle Building Code*.

Other legally required standby system wiring shall be permitted to occupy the same raceways, cables, boxes, and cabinets with other general wiring.

Part III. Sources of Power

Δ **701.12 General Requirements.** Current supply shall be such that, in the event of failure of the normal supply to, or within, the building or group of buildings concerned, legally required standby power will be available within the time required for the application but not to exceed 60 seconds. The supply system for legally required standby purposes, in addition to the normal services to the building, shall be permitted to comprise one or more of the types of systems described in 701.12(A) through (I). Unit equipment in accordance with 701.12(J) shall satisfy the applicable requirements of this article.

N **(A) Power Source Considerations.** In selecting a legally required standby source of power, consideration shall be given to the type of service to be rendered, whether of short-time duration or long duration.

N **(B) Equipment Design and Location.** Consideration shall be given to the location or design, or both, of all equipment to minimize the hazards that might cause complete failure due to floods, fires, icing, and vandalism.

Informational Note: For further information, see ANSI/IEEE 493-2007, *Recommended Practice for the Design of Reliable Industrial and Commercial Power Systems*.

(C) Storage Battery. Storage batteries shall be of suitable rating and capacity to supply and maintain the total load for a minimum period of 1 1/2 hours without the voltage applied to the load falling below 87 1/2 percent of normal. Automotive-type batteries shall not be used.

An automatic battery charging means shall be provided.

(D) Generator Set.

(1) Prime Mover-Driven. For a generator set driven by a prime mover approved by the authority having jurisdiction and sized in accordance with 701.4, means shall be provided for automatically starting the prime mover upon failure of the normal service and for automatic transfer and operation of all required electrical circuits. A time-delay feature permitting a 15-minute setting shall be provided to avoid retransfer in case of short-time re-establishment of the normal source.

(2) Internal Combustion Engines as Prime Mover. Where internal combustion engines are used as the prime mover, an on-site fuel supply shall be provided with an on-premises fuel supply sufficient for not less than 2 hours of full-demand operation of the system. Where power is needed for the operation of the fuel transfer pumps to deliver fuel to a generator set day tank, the pumps shall be connected to the legally required standby power system.

(3) Public Gas System, Municipal Water Supply. Prime movers shall not be solely dependent on a public utility gas system for their fuel supply or on a municipal water supply for their cooling systems. Means shall be provided for automatically transferring one fuel supply to another where dual fuel supplies are used.

((~~Exception: Where approved by the authority having jurisdiction, the use of other than on-site fuels shall be permitted where there is a low probability of a simultaneous failure of both the off-site fuel delivery system and power from the outside electrical utility company.~~))

(4) Battery Power. Where a storage battery is used for control or signal power or as the means of starting the prime mover, it shall be suitable for the purpose and shall be equipped with an automatic charging means independent of the generator set.

(5) Outdoor Generator Sets. Where an outdoor-housed generator set is equipped with a readily accessible disconnecting means in accordance with 445.18, and the disconnecting means is located within sight of the building or structure supplied, an additional disconnecting means shall not be required where ungrounded conductors serve or pass through the building or structure. Where the generator supply conductors terminate at a disconnecting means in or on a building or structure, the disconnecting means shall meet the requirements of 225.36.

(E) Uninterruptible Power Supplies. Uninterruptible power supplies used to provide power for legally required standby systems shall comply with 701.12(B) and (C).

(F) Separate Service. Where approved, a separate service shall be permitted as a legally required source of standby power. This service shall be in accordance with Article 230, with a separate service drop or lateral or a separate set of ((~~overhead or~~)) underground service conductors sufficiently remote electrically and physically from any other service to minimize the possibility of simultaneous interruption of supply from an occurrence in another service.

(G) Connection Ahead of Service Disconnecting Means. Where approved by the authority having jurisdiction, connections located ahead of and not within the same cabinet, enclosure, vertical switchgear section, or vertical switchboard section as the service disconnecting means shall be permitted. The legally required standby service shall be sufficiently separated from the normal main service disconnecting means to minimize simultaneous interruption of supply through an occurrence within the building or groups of buildings served.

Informational Note: See 230.82 for equipment permitted on the supply side of a service disconnecting means.

(H) Fuel Cell System. Fuel cell systems used as a source of power for legally required standby systems shall be of suitable rating and capacity to supply and maintain the total load for not less than 2 hours of full-demand operation.

Installation of a fuel cell system shall meet the requirements of Parts II through VIII of Article 692.

Where a single fuel cell system serves as the normal supply for the building or group of buildings concerned, it shall not serve as the sole source of power for the legally required standby system.

N **(I) DC Microgrid Systems.** Sources connected to a dc microgrid system shall be permitted where the system is capable of being isolated from all nonlegally required sources.

A dc microgrid system used as a source of power for legally required systems shall be of suitable rating and capacity to supply and maintain the total legally required load for not less than 2 hours of full-demand operation.

Where a dc microgrid system source serves as the normal supply for the building or group of buildings concerned, it shall not serve as the sole source of power for the legally required standby system.

(J) Unit Equipment. Individual unit equipment for legally required standby illumination shall consist of the following:

(1) A rechargeable battery

(2) A battery charging means

(3) Provisions for one or more lamps mounted on the equipment and shall be permitted to have terminals for remote lamps

(4) A relaying device arranged to energize the lamps automatically upon failure of the supply to the unit equipment

The batteries shall be of suitable rating and capacity to supply and maintain the total lamp load associated with the unit for not less than the following:

(1) For a period of 1 1/2 hours, without the voltage falling below 87 1/2 percent of normal voltage

(2) The unit equipment shall supply and maintain not less than 60 percent of the initial emergency illumination for a period of at least 1 1/2 hours.

Unit equipment shall be permanently fixed in place (i.e., not portable) and shall have all wiring to each unit installed in accordance with the requirements of any of the wiring methods in Chapter 3. Flexible cord-and-plug connection shall be permitted, provided that the cord does not exceed 900 mm (3 ft) in length. The branch circuit feeding the unit equipment shall be the same branch circuit as that serving the normal lighting in the area and connected ahead of any

local switches. Legally required standby luminaires that obtain power from a unit equipment and are not part of the unit equipment shall be wired to the unit equipment by one of the wiring methods of Chapter 3.

Exception: In a separate and uninterrupted area supplied by a minimum of three normal lighting circuits, a separate branch circuit for unit equipment shall be permitted if it originates from the same panelboard as that of the normal lighting circuits and is provided with a lock-on feature.

Part IV. Overcurrent Protection

701.32 Selective Coordination. Legally required standby system(s) overcurrent devices shall be selectively coordinated with all supply-side overcurrent protective devices.

Selective coordination shall be selected by a licensed professional engineer or other qualified persons engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

Exception No. 1: Selective coordination shall not be required between two overcurrent devices located in series if no loads are connected in parallel with the downstream device.

Exception No. 2: When an electrical engineer provides stamped fault current calculations, the overcurrent protective devices in each disconnecting means may be selectively coordinated with any other supply side overcurrent protective devices for faults with a duration of 0.1 seconds and longer.

Informational Note: See Informational Note Figure 701.32 for an example of how legally required standby system overcurrent protective devices (OCPDs) selectively coordinate with all supply-side OCPDs.

OCPD D selectively coordinates with OCPDs C, F, E, B, and A.
OCPD C selectively coordinates with OCPDs F, E, B, and A.
OCPD F selectively coordinates with OCPD E.
OCPD B is not required to selectively coordinate with OCPD A because OCPD B is not a legally required standby system OCPD.

ARTICLE 705
Interconnected Electric Power Production Sources

705.12 Load-Side Source Connections. The output of an interconnected electric power source shall be permitted to be connected to the load side of the service disconnecting means of the other source(s) at any distribution equipment on the premises. Where distribution equipment or feeders are fed simultaneously by a primary source of electricity and one or more other power source and are capable of supplying multiple branch circuits or feeders, or both, the interconnecting equipment shall comply with 705.12(A) through (E). Where a power control system (PCS) is installed in accordance with 705.13, the setting of the PCS controller shall be considered the power-source output circuit current in 705.12(A) through (E).

(1) The sum of the ratings of all overcurrent devices connected to power production sources shall not exceed the rating of the service.

(2) The output conductors of the electric power production source shall be installed in accordance with Section 230.43.

(A) Dedicated Overcurrent and Disconnect. Each source interconnection of one or more power sources installed in one system shall be made at a dedicated circuit breaker or fusible disconnecting means.

Δ **(B) Bus or Conductor Ampere Rating.** The power source output circuit current multiplied by 125 percent shall be used in ampacity calculations for 705.12(B)(1) through (B)(3).

N **(1) Feeders.** Where the power source output connection is made to a feeder, the feeder shall have an ampacity greater than or equal to 125 percent of the power-source output circuit current. Where the power-source output connection is made to a feeder at a location other than the opposite end of the feeder from the primary source overcurrent device, that portion of the feeder on the load side of the power source output connection shall be protected by one of the following:

a. The feeder ampacity shall be not less than the sum of the primary source overcurrent device and 125 percent of the power-source output circuit current.

b. An overcurrent device at the load side of the power source connection point shall be rated not greater than the ampacity of the feeder.

N **(2) Taps.** Where power source output connections are made at feeders, all taps shall be sized based on the sum of 125 percent of all power source(s) output circuit current(s) and the rating of the overcurrent device protecting the feeder conductors for sizing tap conductors using the calculations in 240.21(B).

N **(3) Busbars.** One of the following methods shall be used to determine the ratings of busbars:

(1) The sum of 125 percent of the power source(s) output circuit current and the rating of the overcurrent device protecting the busbar shall not exceed the ampacity of the busbar.

Informational Note: This general rule assumes no limitation in the number of the loads or sources applied to busbars or their locations.

(2) Where two sources, one a primary power source and the other another power source, are located at opposite ends of a busbar that contains loads, the sum of 125 percent of the power-source(s) output circuit current and the rating of the overcurrent device protecting the busbar shall not exceed 120 percent of the ampacity of the busbar. The busbar shall be sized for the loads connected in accordance with Article 220. A permanent warning label shall be applied to the distribution equipment adjacent to the back-fed breaker from the power source that displays the following or equivalent wording:

WARNING:
POWER SOURCE OUTPUT CONNECTION—
DO NOT RELOCATE THIS OVERCURRENT DEVICE.

The warning sign(s) or label(s) shall comply with 110.21(B).

(3) The sum of the ampere ratings of all overcurrent devices on panelboards, both load and supply devices, excluding the rating of the overcurrent device protecting the busbar, shall not exceed the ampacity of the busbar. The rating of the overcurrent device protecting the busbar shall not exceed the rating of the busbar. Permanent warning labels shall be applied to distribution equipment displaying the following or equivalent wording:

WARNING:
THIS EQUIPMENT FED BY MULTIPLE SOURCES.
TOTAL RATING OF ALL OVERCURRENT DEVICES
EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE
SHALL NOT EXCEED AMPACITY OF BUSBAR.

The warning sign(s) or label(s) shall comply with 110.21(B).

(4) A connection at either end of a center-fed panelboard in dwellings shall be permitted where the sum of 125 percent of the power-source(s) output circuit current and the rating of the overcurrent device protecting the busbar does not exceed 120 percent of the current rating of the busbar.

(5) Connections shall be permitted on switchgear, switchboards, and panelboards in configurations other than those permitted in 705.12(B)(3)(1) through (B)(3)(4) where designed under engineering supervision that includes available fault-current and busbar load calculations.

(6) Connections shall be permitted on busbars of panelboards that supply lugs connected to feed-through conductors. The feed-through conductors shall be sized in accordance with 705.12(B)(1). Where an overcurrent device is installed at the supply end of the feed-through conductors, the busbar in the supplying panelboard shall be permitted to be sized in accordance with 705.12(B)(3)(1) through 705.12(B)(3)(3).

(C) Marking. Equipment containing overcurrent devices in circuits supplying power to a busbar or conductor supplied from multiple sources shall be marked to indicate the presence of all sources.

Δ **(D) Suitable for Backfeed.** Fused disconnects, unless otherwise marked, shall be considered suitable for backfeed. Circuit breakers not marked “line” and “load” shall be considered suitable for backfeed. Circuit breakers marked “line” and “load” shall be considered suitable for backfeed or reverse current if specifically rated.

(E) Fastening. Listed plug-in-type circuit breakers back-fed from electric power sources that are listed and identified as interactive shall be permitted to omit the additional fastener normally required by 408.36(D) for such applications.

ARTICLE 706
Energy Storage Systems

N **706.7 Maintenance.** Energy storage systems shall be maintained in proper and safe operating condition. The required maintenance shall be in accordance with the manufacturer's requirements and industry standards. A written record of the system maintenance shall be kept and shall include records of repairs and replacements necessary to maintain the system in proper and safe operating condition. The written record shall, upon request, be made available to the authority having jurisdiction.

Informational Note: For information related to general electrical equipment maintenance and developing an effective electrical preventative maintenance (EPM) program, see NFPA 70B-2019, *Recommended Practice for Electrical Equipment Maintenance*, or ANSI/NETA ATS-2017, *Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems.*

N **Part II. Disconnecting Means**

706.15 Disconnecting Means.

Δ **(A) ESS Disconnecting Means.** A disconnecting means shall be provided for all ungrounded conductors derived from an ESS and shall be permitted to be integral to listed ESS equipment. Where the ESS system is interactive with other electric power production source(s) and the ESS system disconnect is a knife switch that is not integral to the listed ESS equipment, the ESS system disconnect shall be of the heavy-duty type with two-way interlocking capability and shall comply with the requirements of 404.13(E), 705.20 and 706.16. The disconnecting means shall comply with all of the following:

(1) The disconnecting means shall be readily accessible.

(2) The disconnecting means shall be located within sight of the ESS. Where it is impractical to install the disconnecting means within sight of the ESS, the disconnect shall be installed as close as practicable, and the location of the disconnecting means shall be field marked on or immediately adjacent to the ESS. The marking shall be of sufficient durability to withstand the environment involved and shall not be handwritten.

(3) The disconnecting means shall be lockable open in accordance with 110.25.

For one-family and two-family dwellings, a disconnecting means or its remote control shall be located at a readily accessible location outside the building.

Δ **(B) Remote Actuation.** Where controls to activate the disconnecting means of an ESS are used and are not located within sight of the system, the location of the controls shall be field marked on the disconnecting means.

Δ **(C) Notification and Marking.** Each ESS disconnecting means shall plainly indicate whether it is in the open (off) or closed (on) position and be permanently marked "ENERGY STORAGE SYSTEM DISCONNECT." The disconnecting means shall be legibly marked in the field to indicate the following:

(1) Nominal ESS ac voltage and maximum ESS dc voltage

(2) Available fault current derived from the ESS

(3) An arc-flash label applied in accordance with acceptable industry practice

(4) Date the calculation was performed

Exception: List items (2), (3), and (4) shall not apply to one- and two-family dwellings.

Informational Note No. 1: Industry practices for equipment labeling are described in NFPA *70E*-2018, *Standard for Electrical Safety in the Workplace*. This standard provides specific criteria for developing arc-flash labels for equipment that provides nominal system voltage, incident energy levels, arc-flash boundaries, minimum required levels of personal protective equipment, and so forth.

Informational Note No. 2: Battery equipment suppliers can provide information about available fault current on any particular battery model.

For ESS disconnecting means where the line and load terminals may be energized in the open position, the device shall be marked with the following words or equivalent:

WARNING
ELECTRIC SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD
SIDES MAY BE ENERGIZED IN THE OPEN POSITION

The notification(s) and marking(s) shall comply with 110.21(B).

Δ **(D) Partitions Between Components.** Where circuits from the input or output terminals of energy storage components in an ESS pass through a wall, floor, or ceiling, a readily accessible disconnecting means shall be provided within sight of the energy storage component. Fused disconnecting means or circuit breakers shall be permitted to be used.

ARTICLE 708
CRITICAL OPERATIONS POWER SYSTEMS (COPS)

708.54 Selective Coordination. Critical operations power system(s) overcurrent devices shall be selectively coordinated with all supply-side overcurrent protective devices.

Selective coordination shall be selected by a licensed professional engineer or other qualified persons engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

Exception No. 1: Selective coordination shall not be required between two overcurrent devices located in series if no loads are connected in parallel with the downstream device.

Exception No. 2: When an electrical engineer provides stamped fault current calculations, the overcurrent protective devices in each disconnecting means may be selectively coordinated with any other supply side overcurrent protective devices for faults with a duration of 0.1 seconds and longer.

Informational Note: See Informational Note Figure 708.54 for an example of how critical operations power system overcurrent protective devices (OCPDs) selectively coordinate with all supply-side OCPDs.

OCPD D selectively coordinates with OCPDs C, F, E, B, and A.
OCPD C selectively coordinates with OCPDs F, E, B, and A.
OCPD F selectively coordinates with OCPD E.
OCPD B is not required to selectively coordinate with OCPD A because OCPD B is not a critical operations power system OCPD.

ARTICLE 710
Stand-Alone Systems

710.15 General. Premises wiring systems shall be adequate to meet the requirements of this *Code* for similar installations supplied by a feeder or service. The wiring on the supply side of the building or structure disconnecting means shall comply with the requirements of this *Code*, except as modified by 710.15(A) through (G).

(A) Supply Output. Power supply to premises wiring systems fed by stand-alone or isolated microgrid power sources shall be permitted to have less capacity than the calculated load. The capacity of the sum of all sources of the stand-alone supply shall be equal to or greater than the load posed by the largest single utilization equipment connected to the system. Calculated general lighting loads shall not be considered as a single load.

> Informational Note: For general-use loads the system capacity can be calculated using the sum of the capacity of the firm sources, such as generators and ESS inverters. For specialty loads intended to be powered directly from a variable source, the capacity can be calculated using the sum of the variable sources, such as PV or wind inverters, or the combined capacity of both firm and variable sources.

(B) Sizing and Protection. The circuit conductors between a stand-alone source and a building or structure disconnecting means shall be sized based on the sum of the output ratings of the stand-alone source(s). For three-phase interconnections, the phase loads shall be controlled or balanced to be compatible with specifications of the sum of the power supply capacities.

(C) Single 120-Volt Supply. Stand-alone and isolated microgrid systems shall be permitted to supply 120 volts to single-phase, 3-wire, 120/240-volt service equipment or distribution panels where there are no 240-volt outlets and where there are no multiwire branch circuits. In all installations, the sum of the ratings of the power sources shall be less than the rating of the neutral bus in the service equipment. This equipment shall be marked with the following words or equivalent:

WARNING:
SINGLE 120-VOLT SUPPLY. DO NOT CONNECT MULTIWIRE BRANCH CIRCUITS!

The warning sign(s) or label(s) shall comply with 110.21(B).

N(D) Three-Phase Supply. Stand-alone and micro-grid systems shall be permitted to supply three-phase, 3-wire grounded or 4-wire grounded systems.

(E) Energy Storage or Backup Power System Requirements. Energy storage or backup power supplies shall not be required.

(F) Back-fed Circuit Breakers. Plug-in-type back-fed circuit breakers connected to an interconnected supply shall be secured in accordance with 408.36(D). Circuit breakers marked “line” and “load” shall not be backfed.

(G) Voltage and Frequency Control. The stand-alone or isolated microgrid supply shall be controlled so that voltage and frequency remain within suitable limits for the connected loads.

ARTICLE 760
FIRE ALARM SYSTEMS

760.30 Fire Alarm Circuit Identification. Fire alarm circuits shall be identified at terminal and junction locations in a manner that helps to prevent unintentional signals on fire alarm system circuit(s) during testing and servicing of other systems.

Device and junction boxes for fire alarm systems, other than the surface raceway type, must be substantially red in color, both inside and outside. Power-limited fire protective signaling circuit conductors must be durably and plainly marked in or on junction boxes or other enclosures to indicate that it is a power-limited fire protective signaling circuit.

Informational Note: WAC 296-46B-760, requirements for fire alarm device and junction box identification, is incorporated herein.

CHAPTER 1

SCOPE AND ADMINISTRATION

Note: Chapter 1 is entirely Seattle Amendments to the *International Existing Building Code* and is not underlined.

SECTION 101
SCOPE AND APPLICATION OF CODE

101.1 Title. This subtitle shall be known as the "International Existing Building Code." All references to the *International Existing Building Code* contained in this code mean the *Seattle Existing Building Code*.

101.2 Scope. This code applies to the repair, alteration, change of occupancy, addition to, relocation and maintenance of existing buildings.

Exception: Buildings within the scope of the *International Residential Code* shall comply with the *International Residential Code.*

101.3 Purpose. The purpose of this code is to provide minimum standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, quality of materials, occupancy, location and maintenance of certain existing buildings and structures within the City and certain equipment in those buildings, as specifically regulated herein. The purpose of this code is to provide for and promote the health, safety and welfare of the general public, and not to create or otherwise establish or designate any particular class or group of persons who will or should be especially protected or benefited by the terms of this code.

101.4 Compliance. Except as specifically provided in this code, additions, alterations, repairs and changes of occupancy to, and relocation of any building or structure shall comply with the requirements of the code for new construction. Except as specifically provided in this code, additions, alterations, repairs and changes of occupancy to, and relocation of any building or structure shall be such that the existing building or structure is no less complying with the provisions of the *International Building Code* than the existing building or structure was prior to the alteration, addition, repair, change of occupancy or relocation.

101.4.1 Unless approved by the code official, this code does not justify conditions in buildings or structures that do not comply with the codes in effect at the time the building or structure was built, including permitted additions, alterations, repairs, changes of occupancy and relocations.

101.4.2 Buildings not previously occupied. A building or portion of a building that has not been previously occupied or used for its intended purpose in accordance with the laws in existence at the time of its completion shall comply with the provisions of the *International Building Code* for new construction or with any current permit for such occupancy.

101.4.3 Buildings previously occupied. Buildings in existence at the time of the passage of this code that were legally constructed and occupied in accordance with the provisions of a prior code are permitted to have their existing occupancy continued, provided such occupancy is not unsafe.

101.4.3.1 Establishing occupancy for the record. An occupancy is permitted to be established for any date if:

1. The applicant can provide evidence satisfactory to the code official that the occupancy was in existence on that date, and
2. The building can be made to comply with the building code in effect on that date.

101.4.4 Compliance with retroactive ordinances. Alterations and repairs to existing buildings that are being made in response to a notice or order requiring compliance with the *Housing and Building Maintenance Code*, Subtitle II, Title 22 of the Seattle Municipal Code, the *Fire Code*, Subtitle VI, Title 22 of the Seattle Municipal Code, or other ordinances applicable to existing buildings, are permitted to be made in accordance with standards contained in those ordinances rather than the standards contained in this code.

101.5 Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices and safeguards which are or were required by a code in effect when the building or structure was erected, altered or repaired shall be maintained in conformance with the code edition under which they were installed. The owner or the owner's designated agent shall be responsible for the maintenance of buildings and structures. To determine compliance with this subsection, the code official shall have the authority to require a building or structure to be reinspected. The requirements of this Chapter shall not provide the basis for removal or abrogation of fire protection and safety systems and devices in existing buildings or structures.

Exception: The code official is authorized to modify the requirements of this subsection where all or a portion of a building is unoccupied, closed off and reasonably secure from unlawful entry.

101.6 Internal Consistency. If in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive governs. If there is a conflict between a general requirement and a specific requirement, the specific requirement governs.

101.7 Referenced codes and standards. The codes and standards referenced in this code are considered part of the requirements of this code to the extent prescribed by each such reference. If differences occur between provisions of this code and referenced codes and standards, the provisions of this code apply.

101.8 References to other codes. Whenever an International, National or Uniform Code is referenced in this code, it means the Seattle edition of that code, including local amendments. References to the "Building Code", "Residential Code", "Fire Code", "Mechanical Code" and "Plumbing Code" mean the Seattle editions of those codes.

101.9 Appendices. Provisions in the appendices of the *International Existing Building Code* do not apply, with the exception of Chapters A1 and A3 through A6 of Appendix A, which are herein adopted.

101.10 Metric units. Wherever in this code there is a conflict between metric units of measurement and U.S. customary units, the U.S. customary units govern.

101.11 Impracticality. In cases where total compliance with all the requirements of this code is impractical, the applicant may arrange a pre-design conference with the design team and the code official. The applicant shall identify design solutions and modifications that conform to Section 101.12 or 101.13. The code official may waive specific requirements in this code that the code official determines to be impractical.

101.12 Modifications. The code official may modify the requirements of this code for individual cases if the code official finds: (1) there are practical difficulties involved in carrying out the provisions of this code; (2) the modification is in conformity with the intent and purpose of this code; and (3) the modification will provide a reasonable level of fire protection and structural integrity when considered together with other safety features of the building or other relevant circumstances. The code official may, but is not required to, record the approval of modifications and any relevant information in the files of the code official or on the approved permit plans.

101.13 Alternate materials, methods of construction and design. This code does not prevent the use of any material, design or method of construction not specifically allowed or prohibited by this code, provided the alternate has been approved and its use authorized by the code official.

The code official may approve an alternate, provided the code official finds that the proposed alternate complies with the provisions of this code, and that the alternate, when considered together with other safety features of the building or other relevant circumstances, will provide at least an equivalent level of strength, effectiveness, fire resistance, durability, safety and sanitation.

The code official may require that sufficient evidence or proof be submitted to reasonably substantiate any claims regarding the use or suitability of the alternate. The code official may, but is not required to, record the approval of code alternates and any relevant information in the files of the code official or on the construction documents.

101.14 Unsafe conditions. The code official shall have the authority to require the elimination of conditions deemed *unsafe* in accordance with *International Building Code* Section 102.

SECTION 102
ADMINISTRATION

102.1 General. Additions, alterations, repairs and changes of occupancy to and relocations of buildings and structures are subject to Chapter 1 of the *Seattle Building Code.*

CHAPTER 2

DEFINITIONS

User note:

About this chapter: *Codes, by their very nature, are technical documents. Every word, term and punctuation mark can add to or change the meaning of a technical requirement. It is necessary to maintain a consensus on the specific meaning of each term contained in the code. Chapter 2 performs this function by stating clearly what specific terms mean for the purpose of the code.*

SECTION 201
GENERAL

201.1 Scope. Unless otherwise expressly stated, the following words and terms shall, for the purposes of this code, have the meanings shown in this chapter.

201.2 Interchangeability. Words used in the present tense include the future; words stated in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

201.3 Terms defined in other codes. Where terms are not defined in this code and are defined in the other *International Codes*, such terms shall have the meanings ascribed to them in those codes.

201.4 Terms not defined. Where terms are not defined through the methods authorized by this chapter, such terms shall have ordinarily accepted meanings such as the context implies.

SECTION 202
GENERAL DEFINITIONS

[A] ADDITION. An extension or increase in floor area, number of stories, or height of a building or structure.

[W] ADULT FAMILY HOME. A *dwelling*, licensed by the State of Washington Department of Social and Health Services, in which a person or persons provide personal care, special care, room and board to more than one but not more than six adults who are not related by blood or marriage to the person or persons providing the services. An existing adult family home may provide services to up to eight adults upon approval from the Department of Social and Health Services in accordance with RCW 70.128.066.

[A] ALTERATION. Any construction or renovation to an *existing structure* other than a *repair* or *addition*.

[A] APPROVED. Acceptable to the *code official*.

[A] BUILDING. Any structure utilized or intended for supporting or sheltering any occupancy.

[A] CHANGE OF OCCUPANCY. A change in the use of a building or a portion of a building that results in any of the following:

1. A change of occupancy classification.
2. A change from one group to another group within an occupancy classification.
3. Any change in use within a group for which there is a change in application of the requirements of this code.

[S][A] CODE OFFICIAL. The ((~~officer or other designated authority charged with the administration and enforcement of this code~~)) Director of the Department of Construction and Inspections and authorized representatives.

[S] DAMAGE RATIO. The ratio between the cost of work and the estimated replacement cost of the building, expressed as a percentage.

[S] ((~~[BS] DANGEROUS.~~ ~~Any building, structure or portion thereof that meets any of the conditions described below shall be deemed dangerous:~~

~~1. The building or structure has collapsed, has partially collapsed, has moved off its foundation, or lacks the necessary support of the ground.~~

~~2. There exists a significant risk of collapse, detachment or dislodgement of any portion, member, appurtenance or ornamentation of the building or structure under service loads.~~))

[A] DEFERRED SUBMITTAL. Those portions of the design that are not submitted at the time of the application and that are to be submitted to the *code official* within a specified period.

[S] ((~~[BS] DISPROPORTIONATE EARTHQUAKE DAMAGE.~~ ~~A condition of earthquake related damage where both of the following occur:~~

~~1. The 0.3-second spectral acceleration at the building site as estimated by the United States Geological Survey for the earthquake in question is less than 40 percent of the mapped acceleration parameter S_S.~~

~~2. The vertical elements of the lateral force-resisting system have suffered damage such that the lateral load-carrying capacity of any story in any horizontal direction has been reduced by more than 10 percent from its predamage condition.~~))

EQUIPMENT OR FIXTURE. Any plumbing, heating, electrical, ventilating, air conditioning, refrigerating, and fire protection equipment, and elevators, dumbwaiters, escalators, boilers, pressure vessels and other mechanical facilities or installations that are related to building services. Equipment or fixture shall not include manufacturing, production, or process equipment, but shall include connections from building service to process equipment.

[S][A] EXISTING BUILDING, EXISTING STRUCTURE. A building or structure erected prior to the date of adoption of ((~~the appropriate~~)) this code, or one for which a ((~~legal building permit~~)) valid Certificate of Occupancy has been issued, or one that has passed a final inspection.

[S] ((~~[A] EXISTING STRUCTURE.~~ ~~A structure erected prior to the date of adoption of the appropriate code, or one for which a legal building permit has been issued.~~))

[A] FACILITY. All or any portion of buildings, structures, site improvements, elements and pedestrian or vehicular routes located on a site.

[BS] FLOOD HAZARD AREA. The greater of the following two areas:

1. The area within a flood plain subject to a 1-percent or greater chance of flooding in any year.
2. The area designated as a *flood hazard area* on a community's flood hazard map, or otherwise legally designated.

[S] ((~~[A] HISTORIC BUILDING.~~ ~~Any building or structure that is one or more of the following:~~

~~1. Listed, or certified as eligible for listing, by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, in the National Register of Historic Places.~~

~~2. Designated as historic under an applicable state or local law.~~

~~3. Certified as a contributing resource within a National Register, state designated or locally designated historic district.~~))

[S] LANDMARK. A building or structure that is subject to a requirement to obtain a certificate of approval from the City Landmarks Preservation Board before altering or making significant changes to specific features or characteristics, that has been nominated for designation and the City Landmarks Preservation Board has not issued a determination regarding designation, that has been designated for preservation by the City Landmarks Preservation Board, that has been designated for preservation by the State of Washington, that has been listed or determined eligible to be listed in the National Register of Historic Places, or that is located in a landmark or special review district subject to a requirement to obtain a certificate of approval before making a change to the external appearance of a structure.

[S] LIFE SAFETY PERFORMANCE LEVEL. A post-earthquake damage state that includes damage to structural elements, but the building retains a margin against partial or total collapse. Injuries may occur, but the overall risk of life-threatening injury as a result of structural damage is expected to be low.

[B] NONCOMBUSTIBLE MATERIAL. A material that, under the conditions anticipated, will not ignite or burn when subjected to fire or heat. Materials that pass ASTM E136 are considered noncombustible materials.

PRIMARY FUNCTION. A *primary function* is a major activity for which the facility is intended. Areas that contain a *primary function* include, but are not limited to, the customer services lobby of a bank, the dining area of a cafeteria, the meeting rooms in a conference center, as well as offices and other *work areas* in which the activities of the public accommodation or other private entity using the facility are carried out. Mechanical rooms, boiler rooms, supply storage rooms, employee lounges or locker rooms, janitorial closets, entrances, corridors and restrooms are not areas containing a *primary function*.

[A] REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE. A registered design professional engaged by the owner or the owner's authorized agent to review and coordinate certain aspects of the project, as determined by the *code official*, for compatibility with the design of the building or structure, including submittal documents prepared by others, *deferred submittal* documents and phased submittal documents.

REHABILITATION. Any work, as described by the categories of work defined herein, undertaken in an *existing building*.

RELOCATABLE BUILDING. A partially or completely assembled building constructed and designed to be reused multiple times and transported to different building sites.

[A] REPAIR. The reconstruction, replacement or renewal of any part of an *existing building* for the purpose of its maintenance or to correct damage.

[BS] REROOFING. The process of recovering or replacing an existing roof covering. See "Roof recover" and "Roof replacement."

[BS] RISK CATEGORY. A categorization of buildings and other structures for determination of flood, wind, snow, ice and earthquake loads based on the risk associated with unacceptable performance, as provided in Section 1604.5 of the *International Building Code*.

[BS] ROOF COATING. A fluid-applied adhered coating used for roof maintenance, *roof repair*, or as a component of a roof covering system or roof assembly.

[BS] ROOF RECOVER. The process of installing an additional roof covering over a prepared existing roof covering without removing the existing roof covering.

[BS] ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purpose of correcting damage or restoring the predamage condition.

[BS] ROOF REPLACEMENT. The process of removing the existing roof covering, repairing any damaged substrate and installing a new roof covering.

[BS] SEISMIC FORCES. The loads, forces and requirements prescribed herein, related to the response of the building to earthquake motions, to be used in the analysis and design of the structure and its components. Seismic forces are considered either full or reduced, as provided in Chapter 3.

SUBSTANTIAL ALTERATION. See Section 307.1.

[BS] SUBSTANTIAL DAMAGE. For the purpose of determining compliance with the flood provisions of this code, damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

[S][BS] SUBSTANTIAL IMPROVEMENT. ((~~For the purpose of determining compliance with the flood provisions of this code, any~~)) Any *repair*, *alteration*, *addition*, or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the structure, before the improvement or *repair* is started. If the structure has sustained *substantial damage*, any *repairs* are considered *substantial improvement* regardless of the actual *repair* work performed. The term does not, however, include either of the following:

1. Any project for improvement of a building required to correct existing health, sanitary, or safety code violations identified by the *code official* and that is the minimum necessary to ensure safe living conditions.
2. Any *alteration* of a ((~~historic~~)) *landmark* structure, provided that the *alteration* will not preclude the structure's continued designation as a ((~~historic~~)) *landmark* structure.

[S] ((~~[BS] SUBSTANTIAL STRUCTURAL ALTERATION.~~ ~~An alteration in which the gravity load-carrying structural elements altered within a 5-year period support more than 30 percent of the total floor and roof area of the building or structure. The areas to be counted toward the 30 percent shall include mezzanines, penthouses, and in-filled courts and shafts tributary to the altered structural elements.~~))

[S] ((~~[BS] SUBSTANTIAL STRUCTURAL DAMAGE.~~ ~~A condition where any of the following apply:~~

~~1. The vertical elements of the lateral force-resisting system have suffered damage such that the lateral load-carrying capacity of any story in any horizontal direction has been reduced by more than 33 percent from its predamage condition.~~

~~2. The capacity of any vertical component carrying gravity load, or any group of such components, that has a tributary area more than 30 percent of the total area of the structure's floor(s) and roof(s) has been reduced more than 20 percent from its predamage condition, and the remaining capacity of such affected elements, with respect to all dead and live loads, is less than 75 percent of that required by the *International Building Code* for new buildings of similar structure, purpose and location.~~

~~3. The capacity of any structural component carrying snow load, or any group of such components, that supports more than 30 percent of the roof area of similar construction has been reduced more than 20 percent from its predamage condition, and the remaining capacity with respect to dead, live and snow loads is less than 75 percent of that required by the *International Building Code* for new buildings of similar structure, purpose and location.~~))

TECHNICALLY INFEASIBLE. An *alteration* of a facility that has little likelihood of being accomplished because the existing structural conditions require the removal or *alteration* of a load-bearing member that is an essential part of the structural frame, or because other existing physical or site constraints prohibit modification or addition of elements, spaces or features which are in full and strict compliance with the minimum requirements for new construction and which are necessary to provide accessibility.

[S] UNSAFE. ((~~Buildings, structures or equipment that are unsanitary, or that are deficient due to inadequate means of egress facilities, inadequate light and ventilation, or that constitute a fire hazard, or in which the structure or individual structural members meet the definition of "*Dangerous*," or that are otherwise dangerous to human life or the public welfare, or that involve illegal or improper occupancy or inadequate maintenance shall be deemed unsafe. A vacant structure that is not secured against entry shall be deemed unsafe.~~)) Structurally unsound, provided with inadequate egress, constituting a fire hazard, or otherwise dangerous to human life, or constituting a hazard to safety, health or public welfare.

[S] WORK AREA. That portion or portions of a building consisting of all reconfigured spaces as indicated on the construction documents. Work area excludes other portions of the building where incidental work entailed by the intended work must be performed and portions of the building where work not initially intended by the owner is specifically required by this code. The boundary of the work area includes all spaces not physically separated from rooms or spaces where work is being performed.

CHAPTER 3

PROVISIONS FOR ALL COMPLIANCE METHODS

User note:

About this chapter: *Chapter 3 explains the three compliance options for alterations and additions available in the code. In addition, this chapter also lays out the methods to be used for seismic design and evaluation throughout this code. Finally, this chapter clarifies that provisions in other I-Codes® related to repairs, alterations, additions, relocation and changes of occupancy must also be addressed unless they conflict with this code. In that case, this code takes precedence.*

SECTION 301
((~~ADMINISTRATION~~)) COMPLIANCE METHODS

[S] 301.1 General. All *repairs*, *alterations*, *changes of occupancy*, *additions* and relocations of buildings shall comply with this chapter. The ((~~*repair*,~~)) *alteration*, *change of occupancy*, *addition* or relocation of all *existing buildings* and structures shall also comply with Section 301.2, 301.3, or 301.4.

301.2 Repairs. *Repairs* shall comply with the requirements of Chapter 4.

[S] 301.3 Alteration, addition or change of occupancy. The *alteration*, *addition* or *change of occupancy* of all *existing buildings* and structures shall also comply with one of the methods listed in Section 301.3.1, 301.3.2 or 301.3.3 as selected by the applicant. Sections 301.3.1 through 301.3.3 shall not be applied in combination with each other.

Exception: Subject to the approval of the *code official*, *alterations* ((~~complying~~)) that comply with the laws in existence at the time the building or the affected portion of the building was built shall be considered in compliance with the provisions of this code unless the building is undergoing a *substantial alteration*. New structural members added as part of the *alteration* shall comply with the *International Building Code*. This exception shall not apply to alterations that constitute substantial improvement in *flood hazard areas*, which shall comply with Section 310. ((~~503.2, 701.3 or 1301.3.3. This exception shall not apply to the structural provisions of Chapter 5 or to the structural provisions of Sections 706, 806 and 906.~~))

301.3.1 Prescriptive compliance method. *Alterations*, *additions* and *changes of occupancy* complying with Chapter 5 of this code in buildings complying with the *International Fire Code* shall be considered in compliance with the provisions of this code.

301.3.2 Work area compliance method. *Alterations*, *additions* and *changes of occupancy* complying with the applicable requirements of Chapters 6 through 12 of this code shall be considered in compliance with the provisions of this code.

301.3.3 Performance compliance method. *Alterations*, *additions* and *changes of occupancy* complying with Chapter 13 of this code shall be considered in compliance with the provisions of this code.

[S] 301.4 Relocated buildings. Relocated buildings shall comply with the requirements of ((~~Chapter 14~~)) Section 309.

301.5 Compliance with accessibility. Accessibility requirements for *existing buildings* shall comply with the 2009 edition of ICC A117.1.

[S] SECTION 302
((~~GENERAL PROVISIONS~~))
ADDITIONAL REQUIREMENTS FOR ALL COMPLIANCE METHODS

[S] 302.1 Applicability. The provisions of Section 302 apply to all *alterations*, *repairs*, *additions*, relocations of structures and *changes of occupancy* regardless of the compliance method chosen by the applicant.

[S] 302.2 ((~~Dangerous conditions~~)) RESERVED. ((~~The *code official* shall have the authority to require the elimination of conditions deemed *dangerous*.~~)) **

[S] 302.3 Additional codes. ((~~*Alterations*~~)) Regardless of the compliance method, *alterations*, *repairs*, *additions* and *changes of occupancy* to, or relocation of, *existing buildings* and structures shall comply with the provisions for *alterations*, *repairs*, *additions* and *changes of occupancy* or relocation, respectively, in this code and the *International Energy Conservation Code*, *International Fire Code*, *International Fuel Gas Code*, *International Mechanical Code*, ((~~*International*~~)) *Uniform Plumbing Code*, ((~~*International Private Sewage Disposal Code*, *International Property Maintenance Code*, *International Residential Code*~~)) *Seattle Boiler and Pressure Vessel Code*, *Seattle Electrical Code* and NFPA 70. Elevators and other conveyances shall comply with the *International Building Code*. Where provisions of the other codes conflict with provisions of this code, the provisions of this code shall take precedence.

[S] 302.3.1 Fire prevention. Except as specifically provided for in this code, the provisions of the *International Fire Code* shall apply to matters affecting or relating to structures, processes and premises regarding:

1. The hazard of fire and explosion arising from the storage, handling or use of structures, materials or devices;
2. Conditions hazardous to life, property or public welfare in the occupancy of structures or premises; and
3. The construction, extension, *repair*, *alteration* or removal of fire suppression and alarm systems or fire hazards in the structure or on the premises from occupancy or operation.

[S] 302.4 Existing materials. Materials already in use in a building ((~~in compliance~~)) complying with requirements or approvals in effect at the time of their erection or installation shall be permitted to remain in use unless ((~~determined~~)) the materials are deemed unsafe by the ((~~building~~)) *code official*. ((~~to be unsafe.~~))

302.5 New and replacement materials. Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for *repairs* and *alterations*, provided that unsafe conditions are not created. Hazardous materials shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.

[BS] 302.5.1 New structural members and connections. New structural members and connections shall comply with the detailing provisions of the *International Building Code* for new buildings of similar structure, purpose and location.

Exception: Where alternative design criteria are specifically permitted.

302.6 Occupancy and use. Where determining the appropriate application of the referenced sections of this code, the occupancy and use of a building shall be determined in accordance with Chapter 3 of the *International Building Code.*

[S] 302.7 Safeguards during construction. Regardless of compliance method, *alterations*, repairs *additions* and *changes of occupancy* to, or relocation of, *existing buildings* and structures shall comply with the provisions of Chapter 15.

[S] 302.8 Occupant load increases in Group A occupancies. Regardless of which compliance method is used, when the occupant load in an existing Group A occupancy is increased, an automatic sprinkler system shall be installed in the fire area containing the Group A occupancy if a sprinkler system would be required by *International Building Code* Section 903.2.1 for new construction.

Exception: A sprinkler system is not required if all the following conditions are met:

1. The increase in occupant load is either 50 occupants or less, or no more than 10 percent of the occupant load of the existing Group A occupancy, whichever is greater; and
2. The existing means of egress has adequate capacity to accommodate the additional occupant load; and
3. The total occupant load in the Group A occupancy does not exceed one occupant per 5 square feet; and
4. The increase in occupant load is not part of a *substantial alteration*.

[S] 302.9 Unsafe building appendages. Parapet walls, cornices, spires, towers, tanks, statuary and other appendages or structural members that are supported by, attached to, or a part of a building and that are in a deteriorated condition or are otherwise unable to sustain the design loads that are specified in this code, are hereby designated as *unsafe* building appendages. All such *unsafe* building appendages are public nuisances and shall be abated in accordance with Section 101.14.

[S] 302.10 Unreinforced masonry chimneys. Whenever an unreinforced masonry chimney is altered or *repaired*, or when the building in which such a chimney is located undergoes *substantial alteration*, the chimney shall conform to rules promulgated by the code official.

[S] SECTION 303
STRUCTURAL ((~~DESIGN LOADS AND EVALUATION AND DESIGN PROCEDURES~~)) REQUIREMENTS FOR ALL COMPLIANCE METHODS

* **[S] ((~~[BS] 303.2 Snow loads on adjacent buildings.~~** ~~Where an *alteration* or *addition* changes the potential snow drift effects on an adjacent building, the *code official* is authorized to enforce Section 7.12 of ASCE 7.~~))

[S] 303.1 Structural provisions for alterations. Alterations to any building or structure shall comply with the requirements of Sections 303.1.1 through 303.1.8.

** **[BS] 303.1.1 New structural elements.** New structural elements in alterations, including connections and anchorage, shall comply with the International Building Code.

[BS] 303.1.2 Minimum design loads. The minimum design loads on existing elements of a structure that do not support additional loads as a result of an *alteration* shall be the loads applicable at the time the building was constructed.

** **[BS] 303.1.3 Existing structural elements carrying gravity load.** Any existing gravity load-carrying structural element for which an *alteration* causes an increase in design ((~~dead, live or snow~~)) gravity load ((~~, including snow drift effects,~~)) of more than 5 percent shall be strengthened, supplemented, replaced or otherwise altered as needed to carry the increased gravity

((~~loads~~)) load required by the *International Building Code* for new structures. Any existing gravity load-carrying structural element whose gravity load-carrying capacity is decreased as part of the *alteration* shall be shown to have the capacity to resist the applicable design ((~~dead, live and snow~~)) gravity loads ((~~including snow drift effects~~)) required by the *International Building Code* for new structures.

((~~Exceptions~~)) Exception: ((~~1.~~)) Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes where the ((~~altered~~)) existing building and its alteration ((~~complies~~)) comply with the conventional light-frame construction methods of the *International Building Code*. ((~~or the provisions of the *International Residential Code*.~~

~~2. Buildings in which the increased dead load is due entirely to the addition of a second layer of roof covering weighing 3 pounds per square foot (0.1437 kN/m^2) or less over an existing single layer of roof covering.~~))

[BS] 303.1.3.1 ((~~Live loads~~)) Design live load. Where ((~~an *addition* or~~)) the *alteration* does not result in increased design live load, existing gravity load-carrying structural elements shall be permitted to be evaluated and designed for live loads *approved* prior to the ((~~*addition* or~~)) *alteration*. If the *approved* live load for storage occupancies is less than that required by Section 1607 of the *International Building Code*, the area ((~~designated~~)) designed for the nonconforming live load shall be posted with placards of *approved* design indicating the *approved* live load. Where the ((~~*addition* or~~)) *alteration* ((~~results~~)) does result in increased design live load, the live load required by Section 1607 of the *International Building Code* shall be used.

[BS] 303.1.4 Existing structural elements carrying lateral load. ((~~Except as permitted by Section 503.13, where~~)) Where the *alteration* increases design lateral loads in accordance with Section 1609 or 1613 of the *International Building Code*, or where the *alteration* results in a prohibited structural irregularity as defined in ASCE 7, or where the *alteration* decreases the capacity of any existing lateral load-carrying structural element, the structure of the altered building or structure shall be shown to meet the requirements of Sections 1609 and 1613 of the *International Building Code*. Reduced *International Building Code*-level seismic forces in accordance with Section 303.4.2 shall be permitted.

Exception: Any existing lateral load-carrying structural element whose demand-capacity ratio with the *alteration* considered is not more than 10 percent greater than its demand-capacity ratio with the *alteration* ignored shall be permitted to remain unaltered. For purposes of calculating demand-capacity ratios, the demand shall consider applicable load combinations with design lateral loads or forces in accordance with Sections 1609 and 1613 of the *International Building Code*. Reduced *International Building Code*-level seismic forces in accordance with Section 303.4.2 shall be permitted. For purposes of this exception, comparisons of demand-capacity ratios and calculation of design lateral loads, forces and capacities shall account for the cumulative effects of *additions* and *alterations* since original construction.

[BS] 303.1.5 ((~~Anchorage~~)) Wall anchorage for unreinforced masonry walls in major alterations. Where the ((~~*work area*~~)) portion of the building undergoing the intended *alteration* exceeds 50 percent of the aggregate area of the building, ((~~area,~~)) the building is assigned to Seismic Design Category C, D, E or F, and the building's structural system includes unreinforced masonry ((~~bearing~~)) walls, the *alteration* work shall include installation of wall anchors at the ((~~floor and~~)) roof ((~~lines~~)) line to resist seismic forces, unless an evaluation demonstrates compliance of existing wall anchorage. ((~~Reduced~~)) For purposes of this section, reduced design seismic forces shall be permitted.

[BS] 303.1.6 Anchorage of unreinforced masonry partitions in major alterations. Where the *work area* exceeds 50 percent of the building area, and where the building is assigned to Seismic Design Category C, D, E or F, unreinforced masonry partitions and nonstructural walls within the *work area* and adjacent to egress paths from the *work area* shall be anchored, removed or altered to resist out-of-plane seismic forces, unless an evaluation demonstrates compliance of such items. Use of reduced seismic forces shall be permitted.

[BS] 303.1.7 Voluntary ((~~lateral-force-resisting system alterations~~)) seismic improvements. ((~~Structural *alterations*~~)) *Alterations* to existing structural elements or *additions* of new structural elements that are ((~~intended exclusively to improve the lateral-force-resisting system and are~~)) not otherwise required by ((~~other sections of this code~~)) this chapter and are initiated for the purpose of improving the performance of the seismic force-resisting system of an existing structure or the performance of seismic bracing or anchorage of existing nonstructural elements ((~~shall not be required to meet the requirements of Section 1609 or Section 1613 of the *International Building Code*, provided that all of the following apply~~)) shall be permitted, if an engineering analysis is submitted demonstrating the following:

((~~1. The capacity of existing structural systems to resist forces is not reduced.~~))

1. The altered structure and the altered nonstructural elements are no less conforming to the provisions of the *International Building Code* with respect to earthquake design than they were prior to the *alteration*.

Exception: Any existing lateral load-carrying structural element whose demand-capacity ratio with the *alteration* considered is no more than 10 percent greater than its demand-capacity ratio with the *alteration* ignored shall be permitted to remain unaltered. For purposes of calculating demand-capacity ratios, the demand shall consider applicable load combinations with design lateral loads or forces per Sections 1609 and 1613 of the *International Building Code*. For purposes of this exception, comparisons of demand capacity ratios and calculation of design lateral loads,

forces, and capacities shall account for the cumulative effects of *additions* and *alterations* since original construction.

2. New structural elements are detailed and connected to existing or new structural elements as required ((~~by the *International Building Code*~~)) for new construction.
3. New or relocated nonstructural elements are detailed and connected to existing or new structural elements as required ((~~by the *International Building Code*~~)) for new construction.
4. The *alterations* do not create a structural irregularity as defined in ASCE 7 or make an existing structural irregularity more severe.

** **[S] 303.2 Structural provisions for changes of occupancy.** Where a *change of occupancy* results in a structure being reclassified to a higher *risk category* determined in accordance with Table 1604.5 of the *International Building Code*, the structure shall conform to the seismic requirements for a new structure of the higher risk category. For purposes of this section, compliance with ASCE 41, using a Tier 3 procedure and the two-level performance objective in Table 303.4.1 for the applicable risk category, shall be deemed to meet the requirements of Section 1613 of the *International Building Code*.

Exception: Specific seismic detailing requirements of Section 1613 of the *International Building Code* for a new structure shall not be required to be met where the seismic performance is shown to be equivalent to that of a new structure. A demonstration of equivalence shall consider the regularity, overstrength, redundancy and ductility of the structure.

[S] 303.3 Structural provisions for additions. *Additions* to any building or structure shall comply with the requirements of Sections 303.3.1 through 303.3.2.

** **[BS] 303.3.1 Existing structural elements carrying gravity load.** Any existing gravity load-carrying structural element for which an *addition* and its related *alterations* cause an increase in design ((~~dead, live or snow~~)) gravity load ((~~, including snow drift effects,~~)) of more than 5 percent shall be strengthened, supplemented, replaced or otherwise altered as needed to carry the increased gravity ((~~loads~~)) load required by the *International Building Code* for new structures.

Any existing gravity load-carrying structural element whose ((~~vertical~~)) gravity load-carrying capacity is decreased ((~~as part of the *addition* and its related *alterations*~~)) shall be considered ((~~to be~~)) an altered element subject to the requirements of Section ((~~503.3~~)) 303.1.3. Any existing element that will form part of the lateral load path for any part of the *addition* shall be considered ((~~to be~~)) an existing lateral load-carrying structural element subject to the requirements of Section ((~~502.5~~)) 303.3.2.

((~~**Exception:** Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes where the *existing building* and the *addition* together comply with the conventional light-frame construction methods of the *International Building Code* or the provisions of the *International Residential Code*.~~))

** **[BS] 303.3.1.1 ((~~Live loads~~)) Design live load.** Where ((~~an~~)) the *addition* ((~~or *alteration*~~)) does not result in increased design live load, existing gravity load-carrying structural elements shall be permitted to be evaluated and designed for live loads *approved* prior to the *addition*. ((~~or *alteration*.~~)) If the *approved* live load is less than that required by Section 1607 of the *International Building Code*, the area ((~~designated~~)) designed for the nonconforming live load shall be posted with placards of *approved* design indicating the *approved* live load. Where the *addition* ((~~or *alteration* results~~)) does result in increased design live load, the live load required by Section 1607 of the *International Building Code* shall be used.

** **[BS] 303.3.2 Existing structural elements carrying lateral load.** Where the *addition* is structurally independent of the *existing structure*, existing lateral load-carrying structural elements shall be permitted to remain unaltered. Where the *addition* is not structurally independent of the *existing structure*, the *existing structure* and its *addition* acting together as a single structure shall be shown to meet the requirements of Sections 1609 and 1613 of the *International Building Code*. ((~~using full seismic forces.~~)) For purposes of this section, compliance with ASCE 41, using a Tier 3 procedure and the two-level performance objective in Table 303.4.1 for the applicable risk category, shall be deemed to meet the requirements of Section 1613 of the *International Building Code*.

((~~**Exceptions**~~)) **Exception:** ((~~1.~~)) Any existing lateral load-carrying structural element whose demand-capacity ratio with the *addition* considered is not more than 10 percent greater than its demand-capacity ratio with the *addition* ignored shall be permitted to remain unaltered. For purposes of calculating demand-capacity ratios, the demand shall consider applicable load combinations with design lateral loads or forces in accordance with Sections 1609 and 1613 of the *International Building Code*. For purposes of this exception, comparisons of demand-capacity ratios and calculation of design lateral loads, forces and capacities shall account for the cumulative effects of *additions* and *alterations* since original construction.

((~~2. Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes where the *existing building* and the addition together comply with the conventional light-frame construction methods of the *International Building Code* or the provisions of the *International Residential Code*.~~))

[S][BS] ((~~303.3~~)) 303.4 Seismic evaluation and design procedures. Where required, seismic evaluation or design shall be based on the procedures and criteria ((~~in this section, regardless of which compliance method is used~~)) specified in the *Interna-*

tional Building Code or ASCE 41. The procedures contained in Appendix A of this code shall be permitted to be used as specified in Section 303.4.2.

[BS] ((~~303.3.1~~)) 303.4.1 Compliance with ((~~full~~)) International Building Code–level seismic forces. Where compliance ((~~requires the use of full seismic forces~~)) with the seismic design provisions of the International Building Code is required, the criteria shall be in accordance with one of the following:

1. One-hundred percent of the values in the *International Building Code*. Where the existing seismic force-resisting system is a type that can be designated as "Ordinary," values of R, Ω_0 and C_d used for analysis in accordance with Chapter 16 of the *International Building Code* shall be those specified for structural systems classified as "Ordinary" in accordance with Table 12.2-1 of ASCE 7, unless it can be demonstrated that the structural system will provide performance equivalent to that of a "Detailed," "Intermediate" or "Special" system.
2. ASCE 41, using a Tier 3 procedure and the two-level performance objective in ((~~Table 303.3.1~~)) Table 303.4.1 for the applicable *risk category*.

[BS] TABLE ((~~303.3.1~~)) 303.4.1
PERFORMANCE OBJECTIVES FOR USE IN ASCE 41 FOR COMPLIANCE WITH ((~~FULL~~)) INTERNATIONAL BUILDING CODE–LEVEL SEISMIC FORCES

RISK CATEGORY (Based on IBC Table 1604.5)	STRUCTURAL PERFORMANCE LEVEL FOR USE WITH BSE-1N EARTHQUAKE HAZARD LEVEL	STRUCTURAL PERFORMANCE LEVEL FOR USE WITH BSE-2N EARTHQUAKE HAZARD LEVEL
I	Life Safety (S-3)	Collapse Prevention (S-5)
II	Life Safety (S-3)	Collapse Prevention (S-5)
III	Damage Control (S-2)	Limited Safety (S-4)
IV	Immediate Occupancy (S-1)	Life Safety (S-3)

[BS] ((~~303.3.2~~)) 303.4.2 Compliance with reduced International Building Code seismic forces. Where seismic evaluation and design is permitted to use reduced seismic forces, the criteria used shall be in accordance with one of the following:

1. The *International Building Code* using 75 percent of the prescribed forces. Values of R, Ω_0 and C_d used for analysis shall be as specified in Section ((~~303.3.1~~)) 303.4.1 of this code.
2. Structures or portions of structures that comply with the requirements of the applicable chapter in Appendix A as specified in Items 2.1 through 2.4 and subject to the limitations of the respective Appendix A chapters shall be deemed to comply with this section.
   - 2.1. The seismic evaluation and design of unreinforced masonry bearing wall buildings in *Risk Category* I or II are permitted to be based on the procedures specified in Appendix Chapter A1.
   - ((~~2.2. Seismic evaluation and design of the wall anchorage system in reinforced concrete and reinforced masonry wall buildings with flexible diaphragms in *Risk Category* I or II are permitted to be based on the procedures specified in Chapter A2.~~))
   - 2.3. Seismic evaluation and design of cripple walls and sill plate anchorage in residential buildings of light-frame wood construction in *Risk Category* I or II are permitted to be based on the procedures specified in Chapter A3.
   - 2.4. Seismic evaluation and design of soft, weak, or open-front wall conditions in multiple-unit residential buildings of wood construction in *Risk Category* I or II are permitted to be based on the procedures specified in Chapter A4.
3. ASCE 41, using the performance objective in Table ((~~303.3.2~~)) 303.4.2 for the applicable *risk category*. Footnote a of Table 11.4.2 and Item 3 of Section 11.4.8 of ASCE 7 do not apply.

[BS] TABLE ((~~303.3.2~~)) 303.4.2
PERFORMANCE OBJECTIVES FOR USE IN ASCE 41 FOR COMPLIANCE WITH REDUCED SEISMIC FORCES

RISK CATEGORY (Based on IBC Table 1604.5)	STRUCTURAL PERFORMANCE LEVEL FOR USE WITH BSE-1E EARTHQUAKE HAZARD LEVEL	STRUCTURAL PERFORMANCE LEVEL FOR USE WITH 3/4 BSE-2E EARTHQUAKE HAZARD LEVEL
I	Life Safety (S-3). See Note a	Collapse Prevention (S-5)
II	Life Safety (S-3). See Note a	Collapse Prevention (S-5)
III	Damage Control (S-2). See Note a	Limited Safety (S-4). See Note b
IV	Immediate Occupancy (S-1)	Life Safety (S-3). See Note c

a. For Risk Categories I, II and III, the Tier 1 and Tier 2 procedures need not be considered for the BSE-1E earthquake hazard level.
b. For Risk Category III, the Tier 1 screening checklists shall be based on the Collapse Prevention, except that checklist statements using the Quick Check provisions shall be based on *MS*-factors that are the average of the values for Collapse Prevention and Life Safety.
c. For Risk Category IV, the Tier 1 screening checklists shall be based on Collapse Prevention, except that checklist statements using the Quick Check provisions shall be based on *MS*-factors for Life Safety.

SECTION 304
IN-SITU LOAD TESTS

[BS] 304.1 General. Where used, in-situ load tests shall be conducted in accordance with Section 1708 of the *International Building Code*.

SECTION 305
ACCESSIBILITY FOR EXISTING BUILDINGS

** **305.1 Scope.** The provisions of Sections 305.1 through 305.9 apply to maintenance, *change of occupancy*, *additions* and *alterations* to *existing buildings*, including those identified as ((~~*historic buildings*~~)) *landmarks*.

305.2 Maintenance of facilities. A *facility* that is constructed or altered to be *accessible* shall be maintained *accessible* during occupancy.

[S] 305.3 Extent of application. ((~~An~~)) Maintenance, *alterations*, *change of occupancy*, *additions* to or relocations of *existing buildings* of an existing *facility* shall not impose a requirement for greater accessibility than that which would be required for new construction. ((~~*Alterations*~~)) Maintenance, *alterations*, *change of occupancy*, *additions* to or relocations of *existing buildings* shall not reduce or have the effect of reducing accessibility of a *facility* or portion of a *facility*.

[S] 305.4 Change of occupancy. *Existing buildings* that undergo a change of group or occupancy shall comply with this section.

Exception: Type B dwelling or sleeping units required by Section 1107 of the *International Building Code* are not required to be provided in *existing buildings* and facilities undergoing a *change of occupancy* in conjunction with *alterations* where the *work area* is 50 percent or less of the aggregate area of the building or less than a level 3 *alteration.*

[S] 305.4.1 Partial change of occupancy. Where a portion of the building is changed to a new occupancy classification, any *alterations* shall comply with Sections 305.6, 305.7 and 305.8 as applicable.

305.4.2 Complete change of occupancy. Where an entire building undergoes a *change of occupancy*, it shall comply with Section 305.4.1 and shall have all of the following accessible features:

1. Not fewer than one accessible building entrance.
2. Not fewer than one accessible route from an accessible building entrance to *primary function* areas.
3. Signage complying with Section 1111 of the *International Building Code*.
4. Accessible parking, where parking is being provided.
5. Not fewer than one accessible passenger loading zone, where loading zones are provided.
6. Not fewer than one accessible route connecting accessible parking and accessible passenger loading zones to an accessible entrance.

Where it is *technically infeasible* to comply with the new construction standards for any of these requirements for a change of group or occupancy, Items 1 through 6 shall conform to the requirements to the maximum extent technically feasible.

Exception: The accessible features listed in Items 1 through 6 are not required for an accessible route to Type B units.

305.5 Additions. Provisions for new construction shall apply to *additions.* An *addition* that affects the accessibility to, or contains an area of, a *primary function* shall comply with the requirements in Section 305.7.

[S] 305.6 Alterations. A *facility* that is altered shall comply with the applicable provisions in Chapter 11 of the *International Building Code*, unless *technically infeasible*. Where compliance with this section is *technically infeasible*, the *alteration* shall provide access to the maximum extent technically feasible.

Exceptions:

1. The altered element or space is not required to be on an accessible route, unless required by Section 305.7.
2. Accessible means of egress required by Chapter 10 of the *International Building Code* are not required to be provided in existing facilities.
3. The *alteration* to Type A individually owned dwelling units within a Group R-2 occupancy shall be permitted to meet the provision for a Type B dwelling unit.
4. Type B dwelling or sleeping units required by Section 1107 of the *International Building Code* are not required to be provided in *existing buildings* and facilities undergoing a change of occupancy in conjunction with *alterations* where the *work area* is 50 percent or less of the aggregate area of the building.

305.7 Alterations affecting an area containing a primary function. Where an *alteration* affects the accessibility to, or contains an area of *primary function*, the route to the *primary function* area shall be *accessible*. The accessible route to the *primary function* area shall include toilet facilities and drinking fountains serving the area of *primary function*.

Exceptions:

1. The costs of providing the *accessible* route are not required to exceed 20 percent of the costs of the *alterations* affecting the area of *primary function*.

2. This provision does not apply to *alterations* limited solely to windows, hardware, operating controls, electrical outlets and signs.
3. This provision does not apply to *alterations* limited solely to mechanical systems, electrical systems, installation or *alteration* of fire protection systems and abatement of hazardous materials.
4. This provision does not apply to *alterations* undertaken for the primary purpose of increasing the accessibility of a *facility*.
5. This provision does not apply to altered areas limited to Type B dwelling and sleeping units.

305.8 Scoping for alterations. The provisions of Sections 305.8.1 through 305.8.15 shall apply to *alterations* to *existing buildings* and *facilities*.

305.8.1 Entrances. Where an *alteration* includes alterations to an entrance that is not accessible, and the *facility* has an *accessible* entrance, the altered entrance is not required to be *accessible* unless required by Section 305.7. Signs complying with Section 1111 of the *International Building Code* shall be provided.

305.8.2 Elevators. Altered elements of existing elevators shall comply with ASME A17.1 and ICC A117.1. Such elements shall also be altered in elevators programmed to respond to the same hall call control as the altered elevator.

305.8.3 Platform lifts. Platform (wheelchair) lifts complying with ICC A117.1 and installed in accordance with ASME A18.1 shall be permitted as a component of an accessible route.

[S] 305.8.4 Stairways and escalators in existing buildings. ((~~Where~~)) In *alterations*, *change of occupancy*, or *additions* where an escalator or stairway is added where none existed previously and major structural modifications are necessary for installation, an accessible route shall be provided between the levels served by the escalator or stairways in accordance with Section 1104.4 of the *International Building Code.*

305.8.5 Ramps. Where slopes steeper than allowed by Section 1012.2 of the *International Building Code* are necessitated by space limitations, the slope of ramps in or providing access to existing facilities shall comply with Table 305.8.5.

TABLE 305.8.5
RAMPS

SLOPE	MAXIMUM RISE
Steeper than 1:10 but not steeper than 1:8	3 inches
Steeper than 1:12 but not steeper than 1:10	6 inches

For SI: 1 inch = 25.4 mm.

305.8.6 Accessible dwelling or sleeping units. Where Group I-1, I-2, I-3, R-1, R-2 or R-4 dwelling or sleeping units are being altered or added, the requirements of Section 1107 of the *International Building Code* for Accessible units apply only to the quantity of spaces being altered or added.

[S] 305.8.7 Type A dwelling or sleeping units. Where more than 20 Group R-2 dwelling or sleeping units are being altered or added, the requirements of Section 1107 of the *International Building Code* for Type A units and Chapter 9 of the International Building Code for visible alarms apply only to the quantity of the spaces being altered or added.

[S] 305.8.8 Type B dwelling or sleeping units. Type B dwelling or sleeping units shall comply with the applicable requirements of Section 305.8.8.1.

Exception: When using the provisions of Chapter 9, Group I-1, I-2, R-2, or R-3 dwelling or sleeping units where the first *certificate of occupancy* was issued before March 15, 1991, are not required to provide Type B dwelling or sleeping units.

[S] 305.8.8.1 Type B dwelling or sleeping units. Where four or more Group I-1, I-2, R-1, R-2, or R-3 ((~~or R-4~~)) dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for Type B units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being added. Where Group I-1, I-2, R-1, R-2, or R-3 ((~~or R-4~~)) dwelling or sleeping units are being altered and where the *work area* is greater than 50 percent of the aggregate area of the building, the requirements of Section 1107 of the *International Building Code* for ((~~Type B~~)) units apply only to the quantity of the spaces being altered.

305.8.9 Jury boxes and witness stands. In *alterations*, accessible wheelchair spaces are not required to be located within the defined area of raised jury boxes or witness stands and shall be permitted to be located outside these spaces where the ramp or lift access restricts or projects into the required means of egress.

[S] 305.8.10 Toilet rooms. Where it is *technically infeasible* to alter existing toilet and bathing rooms to be *accessible*, an *accessible* family or assisted-use toilet or bathing room constructed in accordance with Section 1109.2.1 of the *International Building Code* is permitted. The family or assisted-use toilet or bathing room shall be located on the same floor and in the same area as the existing toilet or bathing rooms. The number of toilet facilities and water closets required by the *International Building Code* is permitted to be reduced by one, in order to provide accessible features. At the inaccessible toilet and bathing rooms, provide directional signs indicating the location of the nearest family or assisted-use toilet room or bathing

room. ((~~shall be provided.~~)) These directional signs shall include the International Symbol of Accessibility and sign characters shall meet the visual character requirements in accordance with ICC A117.1.

305.8.11 Additional toilet and bathing facilities. In assembly and mercantile occupancies, where additional toilet fixtures are added, not fewer than one accessible family or assisted-use toilet room shall be provided where required by Section 1109.2.1 of the *International Building Code*. In recreational facilities, where additional bathing rooms are being added, not fewer than one family or assisted-use bathing room shall be provided where required by Section 1109.2.1 of the *International Building Code*.

305.8.12 Dressing, fitting and locker rooms. Where it is *technically infeasible* to provide accessible dressing, fitting or locker rooms at the same location as similar types of rooms, one accessible room on the same level shall be provided. Where separate-sex facilities are provided, accessible rooms for each sex shall be provided. Separate-sex facilities are not required where only unisex rooms are provided.

305.8.13 Fuel dispensers. Operable parts of replacement fuel dispensers shall be permitted to be 54 inches (1370 mm) maximum, measuring from the surface of the vehicular way where fuel dispensers are installed on existing curbs.

305.8.14 Thresholds. The maximum height of thresholds at doorways shall be 3/4 inch (19.1 mm). Such thresholds shall have beveled edges on each side.

305.8.15 Amusement rides. Where the structural or operational characteristics of an amusement ride are altered to the extent that the amusement ride's performance differs from that specified by the manufacturer or the original design, the amusement ride shall comply with requirements for new construction in Section 1110.4.8 of the *International Building Code*.

[S] 305.9 ((~~Historic buildings~~)) Accessibility provisions for landmark structures. These provisions shall apply to *facilities* designated as ((~~historic~~)) landmark structures that undergo *alterations* or a *change of occupancy*, unless *technically infeasible*. Where compliance with the requirements for accessible routes, entrances or toilet rooms would threaten or destroy the historic significance of the *facility*, as determined by the ((~~authority having jurisdiction~~)) *code official*, the alternative requirements of Sections 305.9.1 through 305.9.4 for that element shall be permitted.

Exception: Type B dwelling or sleeping units required by Section 1107 of the *International Building Code* are not required to be provided in historic buildings.

[S] 305.9.1 Site arrival points. Not fewer than one accessible route from a site arrival point to an accessible entrance shall be provided.

[S] 305.9.2 Multiple-level buildings and facilities. An accessible route from an accessible entrance to public spaces on the level of the accessible entrance shall be provided.

[S] 305.9.3 Entrances. Not fewer than one main entrance shall be accessible.

Exception: If a public entrance cannot be made accessible, an accessible entrance that is unlocked while the building is occupied shall be provided; or, a locked accessible entrance with a notification system or remote monitoring shall be provided.

Signs complying with Section 1111 of the *International Building Code* shall be provided at the public entrance and the accessible entrance.

[S] 305.9.4 Toilet and bathing facilities. Where toilet rooms are provided, not fewer than one accessible family or assisted-use toilet room complying with Section 1109.2.1 of the *International Building Code* shall be provided.

[S] SECTION 306
LANDMARKS

[B] 306.1 Landmarks. The provisions of this code relating to the construction, *repair*, *alteration*, *addition*, restoration and movement of structures, and *change of occupancy* shall be mandatory for landmarks. Landmarks shall comply with the accessibility requirements of Section 305.9.

Exception: Where *approved* by the *code official*, compliance with this code is not required where preservation of historic elements precludes complete compliance and a reasonable degree of safety to the public and the occupants of the building is provided.

[S] SECTION 307
SUBSTANTIAL ALTERATION REQUIREMENTS FOR ALL COMPLIANCE METHODS

[S] 307.1 Substantial alterations or repairs. Regardless of which compliance method is used, a building or structure to which *substantial alterations* or *repairs* are made shall conform with the requirements of this section and the following sections of the *International Building Code:*

1. Section 403 when applicable;

2. Special requirements for the Fire District found in Chapter 4 when applicable;
3. Section 717;
4. Chapter 8;
5. Section 903 and 905;
6. Sections 909.20.5, 909.20.6 and 909.21; and
7. Chapter 10.
8. Fire alarms shall be provided as required by the *International Fire Code*.

[S] 307.1.1 Definition. For the purpose of this section, *substantial alteration* or repair means any one of the following, as determined by the *code official*:

1. *Repair* of a building with a *damage ratio* of 60 percent or more.
2. Remodeling or an *addition* that substantially extends the useful physical or economic life of the building or a significant portion of the building, other than typical tenant remodeling.
3. A change of a significant portion of a building to an occupancy that is more hazardous than the existing occupancy, based on the combined life and fire risk as determined by the *code official*. The *code official* is permitted to use Table 307.1 as a guideline.
4. Reoccupancy of a building that has been substantially vacant for more than 24 months in occupancies other than Group R-3.
5. A significant increase in the occupant load of an unreinforced masonry building.

[S] 307.1.2 Seismic regulations. Buildings or structures to which *substantial alterations* or *repairs* are made shall comply with Section 303.4.2. In addition, the *code official* is authorized to require testing of existing materials when there is insufficient evidence of structural strength or integrity.

Exceptions:

1. If an *alteration* is substantial only because it is a change to a more hazardous occupancy, compliance with this subsection is required only if the life hazard risk increases, as determined by the *code official.*
2. For Group R-3 occupancies, when approved by the *code official*, the applicant is permitted to evaluate and strengthen portions of the building lateral support structure, such as foundations and cripple walls.
3. For permitted one- or two- family dwellings, less than four stories, that are *substantial alterations* due to a move into the SBC, the applicant is permitted to evaluate and strengthen portions of the building lateral support structure, such as foundations and cripple walls, subject to the approval of the *building official.*

[S] 307.1.3 Report. A proposal for structural rehabilitation shall be submitted based on a comprehensive report prepared by a licensed structural engineer according to rules promulgated by the *code official.* The report shall include an investigation and structural analysis of the building based on Section 303.4.2. The report shall specify the building's seismic deficiencies, and propose measures that will provide an acceptable degree of seismic safety considering the nature, size and scope of the project. This requirement shall also apply to Section 101.14 as conditions require.

[S] 307.1.4 Energy use regulations. An *alteration* or *repair* described in Items 1, 2, or 4 of Section 307.1.1 shall comply with Section C503.8 of the *International Energy Conservation Code.*

Exceptions:

1. Existing residential buildings of three stories or less are not required to comply with this section.
2. A project that is defined as a *substantial alteration* primarily due to the seismic retrofitting of a building's unreinforced masonry walls shall not be required to comply with this section.

[S] TABLE 307.1
RATING OF OCCUPANCIES BY DEGREE OF HAZARD

Occupancy	Description	Life	Fire	Combined Rating
A1	Assembly uses, usually with fixed seating, intended for the production and viewing of the performing arts or motion pictures	4	3	12
A2	Assembly uses intended for food and/or drink consumption	4	3	12
A3	Assembly uses intended for worship, recreation or amusement and other assembly uses not classified elsewhere in Group A	4	3	12
A4	Assembly uses intended for viewing of indoor sporting events and activities with spectator seating	3	1	3
A5	Assembly uses intended for participation in or viewing outdoor activities	3	1	3
B	Office, professional or service-type transactions, including storage of records and accounts.	2	1	2
B	Eating & drinking establishments with an occupant load of less than 50	2	1	2
B	Buildings or portions of buildings having rooms used for educational purposes beyond 12th grade	2	1	2
E	Any building used for educational purposes by six or more persons at any one time for educational purposes through the 12th grade	3	2	6
E	Day care centers for more than five children older than 2-1/2 years of age	3	2	6
I4	Facilities that provide accommodations for less than 24 hours for more than five unrelated adults and provides supervision and personal care services; facilities that provide supervision and personal care on less than a 24-hour basis for more than five children 2-1/2 years of age or less	4	3	12
F1	Moderate hazard factory and industrial	2	2	4
F2	Low-hazard factory and industrial	1	1	1
H1	Occupancies with a detonation hazard	5	4	20
H2	Occupancies which present a deflagration hazard or a hazard from accelerated burning	5	4	20
H3	Occupancies containing materials that readily support combustion or that pose a physical hazard	5	4	20
H4	Occupancies containing materials that are health hazards	5	4	20
H5	Semiconductor fabrication facilities	5	4	20
I1	Buildings, structures or portions thereof for more than 16 persons, excluding staff, who reside on a 24-hour basis in a supervised environment and receive custodial care	3	3	9
I2	Buildings and structures used for medical care on a 24-hour basis for more than five persons who are incapable of self-preservation	4	3	12
I3	Buildings and structures that are inhabited by more than five persons who are under restraint or security	4	3	12
M	Buildings used for display and sale of merchandise	3	2	6
R1	Occupancies containing sleeping units where the occupants are primarily transient in nature	3	3	9
R2	Occupancies containing sleeping units or more than two dwelling units where the occupants are primarily permanent in nature	3	3	9
R3	Residential 3 occupancies where the occupants are primarily permanent in nature and not classified as Group R-1, R-2, or I	2	1	2
S1	Moderate hazard storage	2	2	4
S2	Low-hazard storage	1	1	1
U	Buildings and structures of an accessory character and miscellaneous structures	1	1	1

**

[S] SECTION 308
REROOFING

** **[BS] 308.1 General.** Materials and methods of application used for recovering or replacing an existing roof covering shall comply with the requirements of Chapter 15 of the *International Building Code* and the *International Energy Conservation Code*.

Exceptions:

1. *Roof replacement* or roof recover of existing low-slope roof coverings shall not be required to meet the minimum design slope requirement of one-quarter unit vertical in 12 units horizontal (2-percent slope) in Section 1507 of the *International Building Code* for roofs that provide positive roof drainage.

2. Recovering or replacing an existing roof covering shall not be required to meet the requirement for secondary (emergency overflow) drains or scuppers in Section 1502 of the *International Building Code* for roofs that provide for positive roof drainage. For the purposes of this exception, existing secondary drainage or scupper systems required in accordance with this code shall not be removed unless they are replaced by secondary drains or scuppers designed and installed in accordance with Section 1502 of the *International Building Code*.

[BS] 308.2 Structural and construction loads. ((~~Structural roof components shall be capable of supporting the roof covering system and the material and equipment loads that will be encountered during installation of the system.~~)) Where addition or replacement of roofing or replacement of equipment results in additional dead loads, structural components supporting the reroofing equipment shall comply with Section 303.1. **

[BS] 308.3 Roof replacement. *Roof replacement* shall include the removal of all existing layers of roof coverings down to the roof deck. **

Exception: Where the existing roof assembly includes an ice barrier membrane that is adhered to the roof deck, the existing ice barrier membrane shall be permitted to remain in place and covered with an additional layer of ice barrier membrane in accordance with Section 1507 of the *International Building Code*.

[BS] 308.3.1 Roof recover. The installation of a new roof covering over an existing roof covering shall be permitted where any of the following conditions occur:

1. The new roof covering is installed in accordance with the roof covering manufacturer's *approved* instructions.
2. Complete and separate roofing systems, such as standing-seam metal roof panel systems, that are designed to transmit the roof loads directly to the building's structural system and that do not rely on existing roofs and roof coverings for support, are installed.
3. Metal panel, metal shingle and concrete and clay tile roof coverings are installed over existing wood shake roofs in accordance with Section 308.4.
4. A new protective *roof coating* is applied over an existing protective *roof coating*, a metal roof panel, metal roof shingles, mineral-surfaced roll roofing, a built-up roof, modified bitumen roofing, thermoset and thermoplastic single-ply roofing or a spray polyurethane foam roofing system.

[BS] 308.3.1.1 Exceptions. A roof recover shall not be permitted where any of the following conditions occur:

1. The existing roof or roof covering is water soaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.
2. The existing roof covering is slate, clay, cement or asbestos-cement tile.
3. The existing roof has two or more applications of any type of roof covering.

[BS] 308.4 Roof recovering. Where the application of a new roof covering over wood shingle or shake roofs creates a combustible concealed space, the entire existing surface shall be covered with gypsum board, mineral fiber, glass fiber or other *approved* materials securely fastened in place. **

[BS] 308.5 Reinstallation of materials. Existing slate, clay or cement tile shall be permitted for reinstallation, except that damaged, cracked or broken slate or tile shall not be reinstalled. Existing vent flashing, metal edgings, drain outlets, collars and metal counterflashings shall not be reinstalled where rusted, damaged or deteriorated. Aggregate surfacing materials shall not be reinstalled. **

[BS] 308.6 Flashings. Flashings shall be reconstructed in accordance with *approved* manufacturer's installation instructions. Metal flashing to which bituminous materials are to be adhered shall be primed prior to installation. **

[S] SECTION 309
MOVED STRUCTURES

309.1 Nonresidential buildings or structures. Nonresidential buildings or structures moved into or within the city shall comply with standards adopted by the *code official*. The *code official* is authorized to require an inspection of the building before or after moving. The permit holder shall correct all deficiencies identified by the inspection. The *code official* is authorized to require that a bond or cash deposit in an amount sufficient to abate or demolish the building be posted prior to issuance of a permit. See Section 106 of the *International Building Code* for information required on plans. Any moved building that is not in complete compliance with standards for moved buildings within 18 months from the date of permit issuance and is found to be a public nuisance may be abated. Moved buildings and structures shall also comply with the *International Energy Conservation Code.*

309.2 Residential buildings or structures. Residential buildings or structures moved into or within the city are not required to comply with all of the requirements of this code if the original occupancy classification of the building or structure is not changed. Compliance with all of the requirements of this chapter will be required if the moved residential buildings or structures undergo substantial alteration. Work performed on new and existing foundations shall comply with all of the requirements of this code for new construction.

** **[S] SECTION 310**
FLOOD HAZARD AREAS

** **[BS] 310.1 Flood hazard areas.** Buildings and structures in flood hazard areas established in Section 1612.3 of the *International Building Code* shall comply with Sections 310.1.1 through 310.1.3.

((~~In *flood hazard areas, alterations* that~~)) When any combination of *repairs*, *alterations*, or *additions* constitute *substantial improvement*, ((~~shall require that~~)) the *existing building* and all *repairs*, *alterations*, and *additions* shall comply with Section 1612 of the *International Building Code*. ((~~, or Section R322 of the *International Residential Code*, as applicable.~~))

310.1.1 Repairs. Any *repair* that constitutes *substantial improvement* of the existing structure or buildings that have been substantially damaged, as defined in Section 202, shall comply with the flood design requirements for new construction, and all aspects of the existing structure shall be brought into compliance with the requirements for new construction for flood design according to Section 1612 of the *International Building Code*.

Any *repairs* that do not constitute *substantial improvement* or *repair* of *substantial damage* of the existing structure, as defined in Section 202, are not required to comply with the flood design requirements for new construction according to Section 1612 of the *International Building Code*.

Exception: For a new foundation or replacement foundation, the foundation shall comply with Section 1612 of the *International Building Code*.

** **310.1.2 Alterations.** *Alterations* that constitute *substantial improvement* of the existing structure shall comply with the flood design requirements for new construction, and all aspects of the existing structure shall be brought into compliance with the requirements for new construction for flood design according to Section 1612 of the *International Building Code*.

Any alterations that do not constitute *substantial improvement* of the existing structure are not required to comply with the flood design requirements for new construction according to Section 1612 of the *International Building Code*.

Exception: For a new foundation or replacement foundation, the foundation shall comply with Section 1612 of the International Building Code.

310.1.3 Additions. *Additions* shall comply with the flood design requirements for new construction according to Section 1612 of the *International Building Code*.

If the *addition* constitutes *substantial improvement*, the existing structure shall be brought into compliance with the requirements for new construction for flood design according to Section 1612 of the *International Building Code*.

CHAPTER 4

REPAIRS

User note:

About this chapter: *Chapter 4 provides requirements for repairs of existing buildings. The provisions define conditions under which repairs may be made using materials and methods like those of the original construction or the extent to which repairs must comply with requirements for new buildings. Requirements from Section 303 of the 2015 Seattle Existing Building Code have been relocated to this chapter.*

SECTION 401
GENERAL

[S] 401.1 Scope. ((~~*Repairs* shall comply with the requirements of this chapter. *Repairs* to *historic buildings* need only comply with Chapter 12.~~)) Damaged buildings and structures, and parts thereof shall be *repaired* in compliance with this chapter. Work on undamaged parts of a building or structure that is necessary for the required *repair* of damaged parts shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* except as specifically required in this chapter. Routine maintenance, ordinary *repairs* exempt from permit in accordance with *International Building Code* Section 106.2, and abatement of wear due to normal service conditions shall not be subject to the requirements for repairs in this section.

[S] 401.1.1 Determining repair levels. *Repairs* shall be classified as *repair* of minor damage, *repair* of moderate damage, *repair* of significant damage, or repair of extensive damage. Required *repair* levels shall be based on the *damage ratio* as defined in Section 202. *Damage ratios* shall be determined according to rules promulgated by the Director.

[S] 401.1.2 Requirements for repair of minor damage. *Repair* of buildings with *damage ratios* less than 10 percent shall comply with this Section 401.1.2. Repair of unreinforced masonry chimneys shall comply with Section 302.9.

1. Damage to structural elements and fire/life safety systems shall be repaired.
2. New or replaced elements shall comply with current code requirements.

   Exception: Like materials shall be permitted for nonstructural alterations, provided no hazard to life, health or property is created, and the materials do not adversely affect any structural member or result in a change to the fire-resistance rating of any part of the building or structure.
3. New or replaced structural elements shall be tied into new or existing structure in accordance with the structural engineer's recommendations and accepted practice.
4. All structural *repairs* shall be designed and approved by a structural engineer licensed in the State of Washington.
5. Cracked concrete and masonry shall be repaired if repair is required by FEMA 306, 307 and 308.
6. Strengthening of the entire building or structure is not required.
7. Fire protection and life safety systems required when the building was built or altered shall be repaired in accordance with Section 101.5.
8. No portion of the building shall be repaired in such a manner that the building becomes less safe than it was before the damage occurred, nor shall the repair create an unsafe condition as defined in Section 101.14.

[S] 401.1.3 Requirements for repair of moderate damage. *Repair* of buildings with *damage ratios* of at least 10 percent and less than 30 percent shall comply with Section 401.1.2 and this Section 401.1.3. All structures supporting and supported by the damaged portions of the building shall be repaired in accordance with items 1 through 6 below.

1. The capacity of existing structural elements supporting and supported by the damaged portion of the building shall not be less than the capacity of those elements before the damage occurred.
2. The lateral loading to existing elements of the lateral force resisting systems shall not be increased beyond their capacity.
3. New work shall not introduce new irregularities, and shall not worsen existing irregularities.
4. New structural elements shall be detailed and connected to the existing structural elements as required by this code.
5. New or relocated nonstructural elements shall be detailed and connected to existing or new structural elements as required by this code.
6. The *alterations* shall not create an *unsafe* condition.

[S] 401.1.4 Requirements for repair of significant damage. *Repair* of buildings with *damage ratios* of at least 30 percent and less than 50 percent shall comply with Sections 401.1.2, 401.1.3 and this Section 401.1.4.

1. The engineer shall submit a report identifying structural damage, and falling hazards to exitways, pedestrian walkways and public rights of way. The report shall also contain a statement acknowledging that compliance with this section may not satisfy the requirements for *substantial alteration* of Section 307.
2. All identified falling hazards in exits and exit discharges shall be mitigated so as to limit damage at primary means of egress.
3. The walls, roofs and floors of unreinforced masonry buildings shall comply with the sections of ASCE 41 or Appendix A1 in Table 401.1. Seismic forces shall comply with reduced International Building Code forces per Section 303.4.2.

   Exception: If the tested mortar strength is less than the minimums indicated in Table 401.1, Item a, the structure shall comply with all requirements of 303.4.2.
4. Repair of damage for buildings subject to this Section 401.1.4 will be considered when determining whether Section 307 provisions for *substantial alterations* apply.

[S] 401.1.5 Requirements for repair of extensive damage. *Repair* of buildings with *damage ratios* of at least 50 percent and less than 60 percent shall comply with Sections 401.1.2 through 401.1.4 and this Section 401.1.5.

1. The structure shall be *repaired* and designed to satisfy the requirements of ASCE 41 and the performance criteria in Table 303.4.2.
2. A seismic evaluation report shall be submitted. The report shall comply with rules promulgated by the *code official*, and the following requirements:

   2.1 The report shall be prepared by a structural engineer registered in the state of Washington.

   2.2 The report shall be based on ASCE 41 and the performance criteria in Table 303.4.2.

   Exception: Unreinforced masonry buildings are permitted to comply with Appendix A1. The reduction of Section 401.1.4 Item 3 is not allowed.

   2.3 At a minimum, the report shall contain the information listed below. A previously written report may be submitted if it satisfies the requirements of this section.

   2.3.1 An overall description of the building, including size (number of stories and basements, approximate floor area) and the occupancies or uses in the building.

   2.3.2 Identification of building deficiencies.

401.1.6 Requirements for repair of more than extensive damage. Repair of buildings with damage ratios of 60% or more shall comply with Section 307.

[S] TABLE 401.1
REQUIREMENTS FOR UNREINFORCED MASONRY BUILDINGS

COMPONENT	ASCE 41 SECTION	APPENDIX A SECTION
a. Masonry strength (mortar and anchor tests) for anchorage to masonry and for wall bracing	16.2.2.2	A106.2.3
b. Diaphragm shear transfer	16.2.3.2.6	A111.5
c. Out-of-plane transfer	16.2.4.3	A113.1
d. Wall bracing	16.2.4.2	A113.5

* **401.2 Compliance.** The work shall not make the building less complying than it was before the *repair* was undertaken.

[S][BS] 401.3 Flood hazard areas. In flood hazard areas, *repairs* that constitute a *substantial improvement* of the existing structure or buildings that have been *substantially damaged* shall ((~~require that the building~~)) comply with ((~~Section 1612 of the *International Building Code*, or Section R322 of the *International Residential Code*, as applicable~~)) the requirements for repairs in Section 310 of this code.

SECTION 402
BUILDING ELEMENTS AND MATERIALS

402.1 Glazing in hazardous locations. Replacement glazing in hazardous locations shall comply with the safety glazing requirements of the *International Building Code* or *International Residential Code* as applicable.

Exception: Glass block walls, louvered windows and jalousies repaired with like materials.

SECTION 403
FIRE PROTECTION

403.1 General. *Repairs* shall be done in a manner that maintains the level of fire protection provided.

SECTION 404
MEANS OF EGRESS

404.1 General. *Repairs* shall be done in a manner that maintains the level of protection provided for the means of egress.

SECTION 405
STRUCTURAL

[S][BS] 405.1 General. Structural *repairs* shall be in compliance with ((~~this section and~~)) Section ((~~401.2~~)) 303.

[S] ((~~[BS] 405.2 Repairs to damaged buildings.~~ ~~*Repairs* to damaged buildings shall comply with this section.~~

~~**[BS] 405.2.1 Repairs for less than substantial structural damage.** Unless otherwise required by this section, for damage less than *substantial structural damage*, the damaged elements shall be permitted to be restored to their predamage condition.~~

~~**[BS] 405.2.1.1 Snow damage.** Structural components whose damage was caused by or related to snow load effects shall be repaired, replaced or altered to satisfy the requirements of Section 1608 of the *International Building Code*.~~

~~**[BS] 405.2.2 Disproportionate earthquake damage.** A building assigned to Seismic Design Category D, E or F that has sustained *disproportionate earthquake damage* shall be subject to the requirements for buildings with substantial structural damage to vertical elements of the lateral force-resisting system.~~

~~**[BS] 405.2.3 Substantial structural damage to vertical elements of the lateral force-resisting system.** A building that has sustained *substantial structural damage* to the vertical elements of its lateral force-resisting system shall be evaluated in accordance with Section 405.2.3.1, and either repaired in accordance with Section 405.2.3.2 or repaired and retrofitted in accordance with Section 405.2.3.3, depending on the results of the evaluation.~~

~~**Exceptions:**~~

~~1. Buildings assigned to Seismic Design Category A, B or C whose *substantial structural damage* was not caused by earthquake need not be evaluated or retrofitted for load combinations that include earthquake effects.~~

~~2. One- and two-family dwellings need not be evaluated or retrofitted for load combinations that include earthquake effects.~~))

~~**[BS] 405.2.3.1 Evaluation.** The building shall be evaluated by a registered design professional, and the evaluation findings shall be submitted to the *code official*. The evaluation shall establish whether the damaged building, if repaired to its predamage state, would comply with the provisions of the *International Building Code* for load combinations that include wind or earthquake effects, except that the seismic forces shall be the reduced seismic forces.~~

~~**[BS] 405.2.3.2 Extent of repair for compliant buildings.** If the evaluation establishes that the building in its predamage condition complies with the provisions of Section 405.2.3.1, then the damaged elements shall be permitted to be restored to their predamage condition.~~

~~**[BS] 405.2.3.3 Extent of repair for noncompliant buildings.** If the evaluation does not establish that the building in its predamage condition complies with the provisions of Section 405.2.3.1, then the building shall be retrofitted to comply with the provisions of this section. The wind loads for the *repair* and *retrofit* shall be those required by the building code in effect at the time of original construction, unless the damage was caused by wind, in which case the wind loads shall be in accordance with the *International Building Code*. The seismic loads for this *retrofit* design shall be those required by the building code in effect at the time of original construction, but not less than the reduced seismic forces.~~

~~**[BS] 405.2.4 Substantial structural damage to gravity load-carrying components.** Gravity load-carrying components that have sustained *substantial structural damage* shall be rehabilitated to comply with the applicable provisions for dead and live loads in the *International Building Code*. Snow loads shall be considered if the *substantial structural damage* was caused by or related to snow load effects. Undamaged gravity load-carrying components that receive dead, live or snow loads from rehabilitated components shall also be rehabilitated if required to comply with the design loads of the *rehabilitation* design.~~

~~**[BS] 405.2.4.1 Lateral force-resisting elements.** Regardless of the level of damage to vertical elements of the lateral force-resisting system, if *substantial structural damage* to gravity load-carrying components was caused primarily by wind or seismic effects, then the building shall be evaluated in accordance with Section 405.2.3.1 and, if noncompliant, retrofitted in accordance with Section 405.2.3.3.~~

~~**Exceptions:**~~

~~1. Buildings assigned to Seismic Design Category A, B, or C whose substantial structural damage was not caused by earthquake need not be evaluated or retrofitted for load combinations that include earthquake effects.~~

2. ~~One- and two-family dwellings need not be evaluated or retrofitted for load combinations that include earthquake effects.~~

~~**[BS] 405.2.5 Flood hazard areas.** In *flood hazard* areas, buildings that have sustained *substantial damage* shall be brought into compliance with Section 1612 of the *International Building Code*, or Section R322 of the *International Residential Code*, as applicable.~~))

[S] ((~~SECTION 406 ELECTRICAL~~

~~**406.1 Material.** Existing electrical wiring and equipment undergoing *repair* shall be allowed to be repaired or replaced with like material.~~

~~**406.1.1 Receptacles.** Replacement of electrical receptacles shall comply with the applicable requirements of Section 406.4(D) of NFPA 70.~~

~~**406.1.2 Plug fuses.** Plug fuses of the Edison-base type shall be used for replacements only where there is no evidence of over fusing or tampering per applicable requirements of Section 240.51(B) of NFPA 70.~~

~~**406.1.3 Nongrounding type receptacles.** For replacement of nongrounding type receptacles with grounding type receptacles and for branch circuits that do not have an equipment grounding conductor in the branch circuitry, the grounding conductor of a grounding-type receptacle outlet shall be permitted to be grounded to any accessible point on the grounding electrode system or to any accessible point on the grounding electrode conductor in accordance with Section 250.130(C) of NFPA 70.~~

~~**406.1.4 Group I-2 receptacles.** Receptacles in patient bed locations of Group I-2 that are not "hospital grade" shall be replaced with "hospital grade" receptacles, as required by NFPA 99 and Article 517 of NFPA 70.~~

~~**406.1.5 Grounding of appliances.** Frames of electric ranges, wall-mounted ovens, counter-mounted cooking units, clothes dryers and outlet or junction boxes that are part of the existing branch circuit for these appliances shall be permitted to be grounded to the grounded circuit conductor in accordance with Section 250.140 of NFPA 70.~~))

[S] ((~~SECTION 407 MECHANICAL~~

~~**407.1 General.** Existing mechanical systems undergoing *repair* shall not make the building less complying than it was before the damaged occurred.~~

~~**407.2 Mechanical draft systems for manually fired appliances and fireplaces.** A mechanical draft system shall be permitted to be used with manually fired appliances and fireplaces where such a system complies with all of the following requirements:~~

1. ~~The mechanical draft device shall be listed and installed in accordance with the manufacturer's installation instructions.~~
2. ~~A device shall be installed that produces visible and audible warning upon failure of the mechanical draft device or loss of electrical power at any time that the mechanical draft device is turned on. This device shall be equipped with a battery backup if it receives power from the building wiring.~~
3. ~~A smoke detector shall be installed in the room with the appliance or fireplace. This device shall be equipped with a battery backup if it receives power from the building wiring.~~))

[S] ((~~SECTION 408 PLUMBING~~

~~**408.1 Materials.** Plumbing materials and supplies shall not be used for *repairs* that are prohibited in the *International Plumbing Code*.~~

~~**408.2 Water closet replacement.** The maximum water consumption flow rates and quantities for all replaced water closets shall be 1.6 gallons (6 L) per flushing cycle.~~

* ~~**Exception:** Blowout-design water closets [3.5 gallons (13 L) per flushing cycle].~~))

CHAPTER 5

PRESCRIPTIVE COMPLIANCE METHOD

User note:

About this chapter: *Chapter 5 provides details for the prescriptive compliance method—one of the three main options of compliance available in this code for buildings and structures undergoing alteration, addition or change of occupancy.*

SECTION 501
GENERAL

[S] 501.1 Scope. The provisions of this chapter shall control the *alteration*, *addition* and *change of occupancy* of *existing buildings* and structures. ((~~, including *historic buildings* and structures as referenced in Section 301.3.1.~~))

Exception: Existing bleachers, grandstands and folding and telescopic seating shall comply with ICC 300.

[S] 501.1.1 Compliance with other methods. *Alterations*, *additions* and *changes of occupancy* to *existing buildings* and structures shall comply with the provisions of this chapter or with one of the methods provided in Section 301.3. *

Note: All *alterations*, *additions* and *changes of occupancy* are also required to comply with Chapter 3.

501.2 Fire-resistance ratings. Where *approved* by the *code official*, in buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code* has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. The building is required to meet the other applicable requirements of the *International Building Code*.

Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the *code official* to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features, including fire-resistance-rated assemblies and smoke-resistive assemblies, conditions of occupancy, means of egress conditions, fire code deficiencies, *approved* modifications or *approved* alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.

SECTION 502
ADDITIONS

[S] 502.1 General. *Additions* to any building or structure shall comply with the requirements of the *International Building Code* for new construction. Alterations to the *existing building* or structure shall be made to ensure that the *existing building* or structure together with the *addition* are not less complying with the provisions of the *International Building Code* than the *existing building* or structure was prior to the *addition*. An *existing building* together with its *additions* shall comply with the height and area provisions of Chapter 5 of the *International Building Code*.

Note: A significant addition to an existing building may be considered a substantial alteration in accordance with Section 307.

[S] 502.1.1 Fire walls. An existing nonconforming building to which an *addition* is made is permitted to exceed the height, number of stories and area specified for new buildings if a fire wall is provided, the *existing building* is not made more nonconforming, and the *addition* conforms to this code.

[S][BS] ((~~502.2 Disproportionate earthquake damage.~~ ~~A building assigned to Seismic Design Category D, E or F that has sustained *disproportionate earthquake damage* shall be subject to the requirements for buildings with substantial structural damage to vertical elements of the lateral force-resisting system.~~))

[S] 502.2 Structural. *Additions* to *existing buildings* shall comply with Section 303.3. *

[S] ((~~502.6~~)) 502.3 Smoke alarms in existing portions of a building. Where an *addition* is made to a building or structure of a Group R or I-1 occupancy, the *existing building* shall be provided with smoke alarms in accordance with Section 1103.8 of the *International Fire Code*. *

[S] ((~~502.7~~)) 502.4 Carbon monoxide alarms in existing portions of a building. Where an *addition* is made to a building or structure of Group I-1, I-2, I-4 or R occupancy, the existing building shall be provided with carbon monoxide alarms in accordance with Section 1103.9 of the *International Fire Code* or Section R315 of the *International Residential Code*, as applicable.

Exceptions:

1. Work involving the exterior surfaces of buildings, such as the replacement of roofing or siding, the addition or replacement of windows or doors, or the addition of porches or decks.
2. Installation, alteration or *repairs* of plumbing or mechanical systems, other than fuel-burning appliances.

[S] ((~~502.8 Additions to Group E facilities.~~ ~~For *additions* to Group E occupancies, storm shelters shall be provided in accordance with Section 1106.1.~~))

[S] 502.5 Addition of dwelling units. Automatic sprinkler systems are required when new dwelling units are added to buildings according to Items 1 through 5 below. This provision is permitted to be used to add one unit after October 29, 1990.

1. One unit is permitted to be added to a residential or commercial building without an automatic sprinkler system unless sprinklers are otherwise required by this section. If more than one unit is added, the new units shall be equipped with a sprinkler system.
2. In buildings that do not comply with the provisions of this code for number of stories, allowable area, height or type of construction before the unit is added, an automatic sprinkler system shall be provided in the new unit. The addition of the new unit shall not be allowed if it increases the nonconformity.
3. In buildings undergoing *substantial alteration*, an automatic sprinkler system shall be installed where required by this code for new construction.
4. One unit is permitted to be added to an existing duplex without an automatic sprinkler system where both of the following conditions are met:
   - 4.1 The project is considered a *substantial alteration* only because of the change of occupancy; and
   - 4.2 The building complies with the requirements for building height and number of stories for a Group R-2 occupancy.
5. Where one unit is added to an existing duplex, sprinklers are required in the new unit and not in the existing units where all of the following conditions are met:
   - 5.1 The existing duplex does not comply with the requirements for building height and story count for a Group R-2 occupancy;
   - 5.2 The project is considered a *substantial alteration* only because of the *change of occupancy;*
   - 5.3 The new unit is constructed as an *addition* to the duplex;
   - 5.4 The new unit is separated from the existing duplex by a fire wall; and
   - 5.5 The *addition* by itself complies with the requirements for a Group R-2 occupancy.

SECTION 503
ALTERATIONS

[S] 503.1 General. Except as provided by Section 302.4, 302.5 or this section, *alterations* to any building or structure shall comply with the requirements of the *International Building Code* for new construction. *Alterations* shall be such that the *existing building* or structure is not less complying with the provisions of the *International Building Code* than the *existing building* or structure was prior to the *alteration*.

Exceptions:

1. ((~~An~~)) Subject to the approval of the code official, existing stairways shall not be required to comply with the requirements of Sections 1011.3 and 1011.5.2 of the *International Building Code* where the existing space and construction ((~~does~~)) do not allow a reduction in pitch or slope.
2. Handrails otherwise required to comply with Section 1011.11 of the *International Building Code* shall not be required to comply with the requirements of Section 1014.6 of the *International Building Code* regarding full extension of the handrails where such extensions would be hazardous because of plan configuration.
3. Where changes to offices, outpatient clinics or medical offices occur on a multi-tenant floor that contains non-conforming corridors, new tenant walls associated with the tenant change need not meet the standards for one-hour corridor construction, unless the project is considered a *substantial alteration.*
4. Automatic sprinkler systems are required when new dwelling units are added to buildings according to Items 4.1 through 4.6 below. This exception is permitted to be used to add one unit after October 29, 1990.

4.1 One unit is permitted to be added to a residential or commercial building without an automatic sprinkler system unless sprinklers are otherwise required by this section. If more than one unit is added, the new units shall be equipped with a sprinkler system.

4.2 In buildings that do not comply with the provisions of this code for number of stories, allowable area, height or type of construction before the unit is added, an automatic sprinkler system shall be provided in the new unit. The addition of the new unit shall not be allowed if it increases the nonconformity.

4.3 In buildings undergoing *substantial alteration*, an automatic sprinkler system shall be installed where required by this code for new construction.

4.4 One unit is permitted to be added to an existing duplex without an automatic sprinkler system where both of the following conditions are met:

4.4.1 The project is considered a *substantial alteration* only because of the *change of occupancy;* and

4.4.2 The building complies with the requirements for building height and number of stories for a Group R-2 occupancy.

4.5 Where one unit is added to an existing duplex, sprinklers are required in the new unit and not in the existing units where all of the following conditions are met:

4.5.1 The existing duplex does not comply with the requirements for building height and story count for a Group R-2 occupancy;

4.5.2 The project is considered a *substantial alteration* only because of the *change of occupancy;*

4.5.3 The new unit is constructed as an *addition* to the duplex;

4.5.4 The new unit is separated from the existing duplex by a fire wall; and

4.5.5 The addition by itself complies with the requirements for a Group R-2 occupancy.

4.6 A sprinkler system is not required when a Group U occupancy that is accessory to a Group R-3 occupancy is converted to a dwelling unit.

5. Ceilings in basements are permitted to project to within 6 feet 8 inches (2032 mm) of the finished floor, and beams, girders, ducts or other obstructions are permitted to project to within 6 feet 4 inches (1931 mm) of the finished floor.

6. Ceiling height in buildings in existence prior to October 17, 1979, shall be permitted to comply with rules promulgated by the code official.

((~~3~~)) 7. Where provided in below-grade transportation stations, existing and new escalators shall be permitted to have a clear width of no less than 32 inches (815 mm).

[S] 503.2 Structural. *Alterations* to *existing buildings* and structures shall comply with Section 303.1. *

[S] ((~~[BS] 503.5 Seismic Design Category F.~~ ~~Where the *work area* exceeds 50 percent of the building area, and where the building is assigned to Seismic Design Category F, the structure of the altered building shall meet the requirements of Sections 1609 and 1613 of the *International Building Code*. Reduced seismic forces shall be permitted.~~)) *

[S] ((~~[BS] 503.6 Bracing for unreinforced masonry parapets on reroofing.~~ ~~Where the intended *alteration* requires a permit for reroofing and involves removal of roofing materials from more than 25 percent of the roof area of a building assigned to Seismic Design Category D, E or F that has parapets constructed of unreinforced masonry, the work shall include installation of parapet bracing to resist out-of-plane seismic forces, unless an evaluation demonstrates compliance of such items. Reduced seismic forces shall be permitted.~~))

[S] ((~~[BS] 503.7 Anchorage for concrete and reinforced masonry walls.~~ ~~Where the *work area* exceeds 50 percent of the building area, the building is assigned to Seismic Design Category C, D, E or F and the building's structural system includes concrete or reinforced masonry walls with a flexible roof diaphragm, the *alteration* work shall include installation of wall anchors at the roof line, unless an evaluation demonstrates compliance of existing wall anchorage. Use of reduced seismic forces shall be permitted.~~))

[S] ((~~[BS] 503.9 Bracing for unreinforced masonry parapets in major alterations.~~ ~~Where the *work area* exceeds 50 percent of the building area, and where the building is assigned to Seismic Design Category C, D, E or F, parapets constructed of unreinforced masonry shall have bracing installed as needed to resist out-of-plane seismic forces, unless an evaluation demonstrates compliance of such items. Reduced seismic forces shall be permitted.~~)) *

[S] ((~~[BS] 503.11 Substantial structural alteration.~~ ~~Where the *work area* exceeds 50 percent of the building area and where work involves a *substantial structural alteration*, the lateral load-resisting system of the altered building shall satisfy the requirements of Sections 1609 and 1613 of the *International Building Code*. Reduced seismic forces shall be permitted.~~ *

~~**Exceptions:**~~

~~1. Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes that are altered based on the conventional light-frame construction methods of the *International Building Code* or in compliance with the provisions of the *International Residential Code*.~~

~~2. Where the intended *alteration* involves only the lowest story of a building, only the lateral load-resisting components in and below that story need comply with this section.~~))

[S] ((~~[BS] 503.12 Roof diaphragms resisting wind loads in high wind regions.~~ ~~Where the intended *alteration* requires a permit for reroofing and involves removal of roofing materials from more than 50 percent of the roof diaphragm of a building or section of a building located where the ultimate design wind speed is greater than 115 mph (51 m/s) in accordance with Figure 1609.3(1) of the *International Building Code* or in a special wind region as defined in Section 1609 of the *International Building Code*, roof diaphragms, connections of the roof diaphragm to roof framing members, and roof-to-wall connections shall be evaluated for the wind loads specified in Section 1609 of the *International Building Code*, including wind uplift. If the diaphragms and connections in their current condition are not capable of resisting 75 percent of those wind loads, they shall be replaced or strengthened in accordance with the loads specified in Section 1609 of the *International Building Code*.~~))

* **[S] ((~~503.14~~)) 503.3 Smoke alarms.** Individual sleeping units and individual dwelling units in Group R and I-1 occupancies shall be provided with smoke alarms in accordance with Section 1103.8 of the *International Fire Code*.

[S] ((~~503.15~~)) 503.4 Carbon monoxide alarms. Carbon monoxide alarms shall be provided to protect sleeping units and dwelling units in Group I-1, I-2, I-4 and R occupancies in accordance with Section 1103.9 of the *International Fire Code*.

Exceptions:

1. Work involving the exterior surfaces of buildings, such as the replacement of roofing or siding, the addition or replacement of windows or doors, or the addition of porches or decks.
2. Installation, alteration or *repairs* of plumbing or mechanical systems, other than fuel-burning appliances.

[S] ((~~503.16~~)) 503.5 Refuge areas. Where *alterations* affect the configuration of an area utilized as a refuge area, the capacity of the refuge area shall not be reduced below that required in Sections ((~~503.16.1~~)) 503.5.1 through ((~~503.16.3~~)) 503.5.3.

[S] ((~~503.16.1~~)) 503.5.1 Smoke compartments. In Group I-2 and I-3 occupancies, the required capacity of the refuge areas for smoke compartments in accordance with Sections 407.5.1 and 408.6.2 of the *International Building Code* shall be maintained.

[S] ((~~503.16.2~~)) 503.5.2 Ambulatory care. In ambulatory care facilities required to be separated by Section 422.2 of the *International Building Code*, the required capacity of the refuge areas for smoke compartments in accordance with Section 422.3.2 of the *International Building Code* shall be maintained.

[S] ((~~503.16.3~~)) 503.5.3 Horizontal exits. The required capacity of the refuge area for horizontal exits in accordance with Section 1026.4 of the *International Building Code* shall be maintained.

SECTION 504
FIRE ESCAPES

[S] 504.1 Where permitted. Fire escapes that are altered shall ((~~be permitted only as provided for in Sections 504.1.1 through 504.1.4~~)) comply with this section. Existing fire escapes shall continue to be accepted as a component in the means of egress in *existing buildings* only.

((~~**504.1.1 New buildings.** Fire escapes shall not constitute any part of the required means of egress in new buildings.~~

~~**504.1.2 Existing fire escapes.** Existing fire escapes shall continue to be accepted as a component in the means of egress in *existing buildings* only.~~

~~**504.1.3 New fire escapes.** New fire escapes for *existing buildings* shall be permitted only where exterior stairways cannot be utilized because of lot lines limiting stairway size or because of sidewalks, alleys or roads at grade level. New fire escapes shall not incorporate ladders or access by windows.~~

~~**504.1.4 Limitations.** Fire escapes shall comply with this section and shall not constitute more than 50 percent of the required number of exits nor more than 50 percent of the required exit capacity.~~))

[S] 504.2 Location. Where located on the front of the building and where projecting beyond the building line, the lowest landing shall be not less than ((~~7 feet (2134 mm)~~)) 8 feet (2438 mm) or more than 12 feet (3658 mm) above grade, and shall be equipped with a counterbalanced stairway to the street. In alleyways and thoroughfares less than 30 feet (9144 mm) wide, the clearance under the lowest landing shall be not less than 12 feet (3658 mm).

[S] 504.3 Construction. The fire escape shall be designed to support a live load of 100 pounds per square foot (4788 Pa) and shall be constructed of steel or other *approved noncombustible materials*. ((~~Fire escapes constructed of wood not less than nominal 2 inches (51 mm) thick are permitted on buildings of Type V construction. Walkways and railings located over or supported by combustible roofs in buildings of Type III and IV construction are permitted to be of wood not less than nominal 2 inches (51 mm) thick.~~))

504.4 Dimensions. Stairways shall be not less than 22 inches (559 mm) wide with risers not more than, and treads not less than, 8 inches (203 mm) and landings at the foot of stairways not less than 40 inches (1016 mm) wide by 36 inches (914 mm) long, located not more than 8 inches (203 mm) below the door.

504.5 Opening protectives. Doors and windows within 10 feet (3048 mm) of fire escape stairways shall be protected with 3/4-hour opening protectives.

Exception: Opening protection shall not be required in buildings equipped throughout with an *approved* automatic sprinkler system.

SECTION 505
WINDOWS AND EMERGENCY ESCAPE OPENINGS

505.1 Replacement glass. The installation or replacement of glass shall be as required for new installations.

505.2 Replacement window opening control devices. In Group R-2 or R-3 buildings containing dwelling units, ((~~and one- and two-family dwellings and townhouses regulated by the *International Residential Code*,~~)) window opening control devices complying with ASTM F2090 shall be installed where an existing window is replaced and where all of the following apply to the replacement window:

1. The window is operable.
2. The window replacement includes replacement of the sash and the frame.
3. One of the following applies:
   3.1. In Group R-2 or R-3 buildings containing dwelling units, the top of the sill of the window opening is at a height less than 36 inches (915 mm) above the finished floor.
   ((~~3.2. In one- and two-family dwellings and townhouses regulated by the *International Residential Code*, the top of the sill of the window opening is at a height less than 24 inches (610 mm) above the finished floor.~~))
4. The window will permit openings that will allow passage of a 4-inch-diameter (102 mm) sphere when the window is in its largest opened position.
5. The vertical distance from the top of the sill of the window opening to the finished grade or other surface below, on the exterior of the building, is greater than 72 inches (1829 mm).

The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by Section 1030.2 of the *International Building Code*.

Exceptions:

1. Operable windows where the top of the sill of the window opening is located more than 75 feet (22 860 mm) above the finished grade or other surface below, on the exterior of the room, space or building, and that are provided with window fall prevention devices that comply with ASTM F2006.
2. Operable windows with openings that are provided with window fall prevention devices that comply with ASTM F2090.

[S] 505.3 Replacement window emergency escape and rescue openings. Where windows are required to provide *emergency escape* and *rescue openings* in Group R-2 and R-3 occupancies ((~~and one- and two-family dwellings and townhouses regulated by the *International Residential Code*,~~)) replacement windows shall be exempt from the requirements of Sections 1030.2, 1030.3 and 1030.4 of the *International Building Code* and Sections R310.2.1, R310.2.2 and R310.2.3 of the *International Residential Code*, provided that the replacement window meets the following conditions:

1. The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.
2. The replacement of the window is not part of a *change of occupancy*.

Window opening control devices complying with ASTM F2090 shall be permitted for use on windows required to provide emergency escape and rescue openings.

[S] 505.4 Emergency escape and rescue openings. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys or tools. Bars, grilles, grates or similar devices are permitted to be placed over emergency escape and rescue openings provided that the minimum net clear opening size complies with the code that was in effect at the time of construction and such devices shall be releasable or removable from the inside without the use of a key, tool or force greater than that which is required for normal operation of the escape and rescue opening. Where such bars, grilles, grates or similar devices are installed, they shall not reduce the net clear opening of the emergency escape and rescue openings. ((~~Smoke alarms shall be installed in accordance with Section 907.2.10 of the *International Building Code* regardless of the valuation of the *alteration*.~~))

SECTION 506
CHANGE OF OCCUPANCY

[S] 506.1 Compliance. A *change of occupancy* shall not be made in any building or portion thereof unless that building is made to comply with the requirements of the *International Building Code* for the use or occupancy. Changes of occupancy in a building or portion thereof shall be such that the *existing building* is not less complying with the provisions of ((~~this code~~)) the *International Building Code* than the *existing building* or structure was prior to the change. Subject to the approval of the *code official*, changes of occupancy shall be permitted without complying with all of the requirements of this code for the new occupancy, provided that the new occupancy is less hazardous, based on life and fire risk, than the existing occupancy.

Note: Conditions arising after the adoption of this code, and conditions not legally in existence at the time of adoption of this code may trigger requirements based on *International Fire Code* Section 102.1, including building upgrades.

Exceptions:

1. The building need not be made to comply with Chapter 16 of the *International Building Code* unless required by Section ((~~506.4~~)) 303.2.
2. Subject to the approval of the *code official*, an automatic sprinkler system is not required in dwelling units according to Items 2.1 through 2.6 below. This exception is permitted to be used for the change in occupancy for one dwelling unit after October 29, 1990.
   - 2.1 The occupancy of one unit is permitted to be changed to a dwelling unit without an automatic sprinkler system unless sprinklers are otherwise required by this chapter. If more than one unit is changed, the new units shall be equipped with a sprinkler system.
   - 2.2 In buildings that do not comply with the provisions of this code for number of stories, allowable area, height or type of construction before the occupancy of the unit is changed, an automatic sprinkler system shall be provided in the new unit. The *change of occupancy* shall not be allowed if it increases the nonconformity.
   - 2.3 In buildings undergoing *substantial alteration*, an automatic sprinkler system shall be installed where required by this code for new construction.
   - 2.4 The occupancy of one unit is permitted to be changed to a dwelling unit in an existing duplex without an automatic sprinkler system where both of the following conditions are met:
     - 2.4.1 The project is considered a *substantial alteration* only because of the *change of occupancy*; and
     - 2.4.2 The building complies with the requirements for building height and number of stories for a Group R-2 occupancy.
   - 2.5 Where the occupancy of one unit is changed to a dwelling unit in an existing duplex, sprinklers are required in the new unit and not in the existing units where all of the following conditions are met:
     - 2.5.1 The existing duplex does not comply with the requirements for building height and story count for a Group R-2 occupancy;
     - 2.5.2 The project is considered a *substantial alteration* only because of the *change of occupancy*;
     - 2.5.3 The new unit is constructed as an *addition* to the duplex;
     - 2.5.4 The new unit is separated from the existing duplex by a fire wall; and
     - 2.5.5 The addition by itself complies with the requirements for a Group R-2 occupancy.
   - 2.6 A sprinkler system is not required when a Group U occupancy that is accessory to a Group R-3 occupancy is converted to a dwelling unit.

[S] 506.1.1 Change in the ((~~character of~~)) group or use. A change of occupancy with no *change of occupancy* classification shall not be made to any structure that will subject the structure to any special provisions of the applicable *International Codes*, without approval of the *code official*. Compliance shall be only as necessary to meet the specific provisions and is not intended to require the entire building be brought into compliance.

Note: The following illustrate how *change of occupancy* is interpreted:

- Change in classification is a change in the letter designation. An example is a change from B occupancy to R occupancy.
- Change in occupancy group is change in the number designation within an occupancy classification. An example is a change from group R-1 occupancy to R-2 occupancy.
- Change of use is a change in the subcategory within the occupancy group. An example is a change from R-2 apartment to R-2 boarding house.

[S] ((~~506.2 Certificate of occupancy.~~ ~~A certificate of occupancy shall be issued where it has been determined that the requirements for the new occupancy classification have been met.~~))

[S] 506.2 Conversion to residential occupancy. Upon conversion of an *existing building*, or portion thereof, to residential occupancy, *International Building Code* Sections 420, 1203 and 2902 shall apply, and the elements of the dwelling unit envelope that are altered shall comply with the sound transmission control requirements of *International Building Code* Section 1207.

[S] 506.3 Stairways. ((~~An~~)) Subject to the approval of the *code official*, existing stairways shall not be required to comply with the requirements of Section 1011 of the *International Building Code* where the existing space and construction does not allow a reduction in pitch or slope.

[S] 506.4 Structural. Any building undergoing a *change of occupancy* that results in the building being reclassified to a higher risk category shall satisfy the requirements of ((~~this section~~)) Section 303.2.

~~((**506.4.1 Live loads.** Structural elements carrying tributary live loads from an area with a *change of occupancy* shall satisfy the requirements of Section 1607 of the *International Building Code*. Design live loads for areas of new occupancy shall be based on Section 1607 of the *International Building Code*. Design live loads for other areas shall be permitted to use previously *approved* design live loads.~~

~~**Exception:** Structural elements whose demand-capacity ratio considering the *change of occupancy* is not more than 5 percent greater than the demand-capacity ratio based on previously *approved* live loads need not comply with this section.~~

~~**506.4.2 Snow and wind loads.** Where a change of occupancy results in a structure being assigned to a higher *risk category*, the structure shall satisfy the requirements of Sections 1608 and 1609 of the *International Building Code* for the new *risk category*.~~

~~**Exception:** Where the area of the new occupancy is less than 10 percent of the building area, compliance with this section is not required. The cumulative effect of occupancy changes over time shall be considered.~~

~~**506.4.4 Access to Risk Category IV.** Any structure that provides operational access to an adjacent structure assigned to *Risk Category* IV as the result of a *change of occupancy* shall itself satisfy the requirements of Sections 1608, 1609 and 1613 of the *International Building Code*. For compliance with Section 1613, *International Building Code* level seismic forces shall be used. Where operational access to the *Risk Category* IV structure is less than 10 feet (3048 mm) from either an interior lot line or from another structure, access protection from potential falling debris shall be provided.~~)) *

[S] 506.5 Substantial alterations. *Changes of occupancy* that are *substantial alterations* shall comply with Section 307.

[S] SECTION 507
((~~HISTORIC BUILDINGS~~)) LANDMARKS

507.1 ((~~Historic~~)) Landmark buildings. ((~~The provisions of this code that require improvements relative to a building's existing condition or, in the case of *repairs*, that require improvements relative to a building's predamage condition, shall not be mandatory for *historic buildings* unless specifically required by this section.~~)) Landmark buildings shall comply with Section 306.

~~((**507.2 Life safety hazards.** The provisions of this code shall apply to *historic buildings* judged by the code official to constitute a distinct life safety hazard.~~

~~**[BS] 507.3 Flood hazard areas.** Within flood *hazard areas* established in accordance with Section 1612.3 of the *International Building Code*, or Section R322 of the *International Residential Code*, as applicable, where the work proposed constitutes *substantial improvement*, the building shall be brought into compliance with Section 1612 of the *International Building Code*, or Section R322 of the *International Residential Code*, as applicable.~~

~~**Exception:** *Historic buildings* meeting any of the following criteria need not be brought into compliance:~~

~~1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places.~~
~~2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district.~~
~~3. Designated as historic under a state or local historic preservation program that is *approved* by the Department of Interior.~~

~~**[BS] 507.4 Structural.** Historic buildings shall comply with the applicable structural provisions in this chapter.~~

~~**Exceptions:**~~

~~1. The *code official* shall be authorized to accept existing floors and existing live loads and to approve operational controls that limit the live load on any floor.~~
~~2. Repair of *substantial structural damage* is not required to comply with Sections 405.2.3, and 405.2.4. *Substantial structural damage* shall be repaired in accordance with Section 405.2.1.~~)) *

CHAPTER 6

CLASSIFICATION OF WORK

User note:

About this chapter: *Chapter 6 provides an overview of the Work Area Method available as an option for rehabilitation of a building. The chapter defines the different classifications of alterations and provides general requirements for alterations, change of occupancy, additions, historic buildings and relocated buildings. Detailed requirements for all of these are given in Chapters 7 through 12.*

SECTION 601
GENERAL

[S] 601.1 Scope. The provisions of this chapter shall be used in conjunction with Chapters 7 through ((~~12~~)) 11 and 14 and shall apply to the *alteration*, *addition* and *change of occupancy* of *existing structures*. ((~~, including historic and moved structures, as referenced in Section 301.3.2.~~)) The work performed on an *existing building* shall be classified in accordance with this chapter.

Note: All alterations, additions and changes of occupancy are required to comply with Chapter 3.

[S] 601.1.1 Compliance with other alternatives. *Alterations*, *additions* and *changes of occupancy* to *existing structures* shall comply with the provisions of Chapters 3 and 7 through ((~~12~~)) 11 or with one of the alternatives provided in Section 301.3.

601.2 Work area. The *work area*, as defined in Chapter 2, shall be identified on the construction documents.

SECTION 602
ALTERATION—LEVEL 1

602.1 Scope. Level 1 alterations include the removal and replacement or the covering of existing materials, elements, equipment, or fixtures using new materials, elements, equipment, or fixtures that serve the same purpose.

602.2 Application. Level 1 *alterations* shall comply with the provisions of Chapter 7.

SECTION 603
ALTERATION—LEVEL 2

603.1 Scope. Level 2 *alterations* include the reconfiguration of space, the addition or elimination of any door or window, the reconfiguration or extension of any system, or the installation of any additional equipment.

603.2 Application. Level 2 *alterations* shall comply with the provisions of Chapter 7 for Level 1 *alterations* as well as the provisions of Chapter 8.

SECTION 604
ALTERATION—LEVEL 3

604.1 Scope. Level 3 *alterations* apply where the *work area* exceeds 50 percent of the *building area*.

604.2 Application. Level 3 *alterations* shall comply with the provisions of Chapters 7 and 8 for Level 1 and 2 *alterations*, respectively, as well as the provisions of Chapter 9.

SECTION 605
CHANGE OF OCCUPANCY

605.1 Scope. *Change of occupancy* provisions apply where the activity is classified as a *change of occupancy* as defined in Chapter 2.

605.2 Application. *Changes of occupancy* shall comply with the provisions of Chapter 10.

SECTION 606
ADDITIONS

606.1 Scope. Provisions for *additions* shall apply where work is classified as an *addition* as defined in Chapter 2.

606.2 Application. *Additions* to *existing buildings* shall comply with the provisions of Chapter 11.

[S] SECTION 607
((~~HISTORIC BUILDINGS~~)) LANDMARKS

[S] 607.1 Scope. ((~~*Historic building* provisions~~)) *Landmarks* shall ((~~apply to buildings classified as historic as defined in Chapter 2~~)) comply with the provisions of Section 306.

[S] ((~~607.2 Application.~~ ~~Except as specifically provided for in Chapter 12, *historic buildings* shall comply with applicable provisions of this code for the type of work being performed.~~))

SECTION 608
RELOCATED BUILDINGS

608.1 Scope. Relocated building provisions shall apply to relocated or moved buildings.

[S] 608.2 Application. Relocated buildings shall comply with the provisions of ((~~Chapter 14~~)) Section 309.

CHAPTER 7

ALTERATIONS—LEVEL 1

User note:

About this chapter: *Chapter 7 provides the technical requirements for those existing buildings that undergo Level 1 alterations as described in Section 503, which includes replacement or covering of existing materials, elements, equipment or fixtures using new materials for the same purpose. This chapter, similar to other chapters of this code, covers all building-related subjects, such as structural, mechanical, plumbing, electrical and accessibility as well as the fire and life safety issues when the alterations are classified as Level 1. The purpose of this chapter is to provide detailed requirements and provisions to identify the required improvements in the existing building elements, building spaces and building structural system. This chapter is distinguished from Chapters 8 and 9 by involving only replacement of building components with new components. In contrast, Level 2 alterations involve more space reconfiguration, and Level 3 alterations involve more extensive space reconfiguration, exceeding 50 percent of the building area.*

SECTION 701
GENERAL

[S] 701.1 Scope. Level 1 *alterations* as described in Section 602 shall comply with the requirements of this chapter. ((~~Level 1 *alterations* to *historic buildings* shall comply with this chapter, except as modified in Chapter 12.~~))

701.2 Conformance. An *existing building* or portion thereof shall not be altered such that the building becomes less safe than its existing condition.

Exception: Where the current level of safety or sanitation is proposed to be reduced, the portion altered shall conform to the requirements of the *International Building Code*.

[S] 701.4 Emergency escape and rescue openings. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys or tools. Bars, grilles, grates or similar devices placed over emergency escape and rescue openings shall comply with the minimum net clear opening size required by the code that was in effect at the time of construction. Such devices shall be releasable or removable from the inside without the use of a key, tool or force greater than that which is required for normal operation of the escape and rescue opening. Where such bars, grilles, grates or similar devices are installed, they shall not reduce the net clear opening of the emergency escape and rescue openings. ((~~Smoke alarms shall be installed in accordance with Section 907.2.10 of the *International Building Code* regardless of the valuation of the *alteration*.~~)) *

SECTION 702
BUILDING ELEMENTS AND MATERIALS

702.1 Interior finishes. Newly installed interior wall and ceiling finishes shall comply with Chapter 8 of the *International Building Code*.

702.2 Interior floor finish. New interior floor finish, including new carpeting used as an interior floor finish material, shall comply with Section 804 of the *International Building Code*.

702.3 Interior trim. Newly installed interior trim materials shall comply with Section 806 of the *International Building Code*.

[S] 702.4 Window opening control devices on replacement windows. In Group R-2 or R-3 buildings containing dwelling units, ((~~and one- and two-family dwellings and townhouses regulated by the *International Residential Code*,~~)) window opening control devices complying with ASTM F2090 shall be installed where an existing window is replaced and where all of the following apply to the replacement window:

1. The window is operable.
2. The window replacement includes replacement of the sash and the frame.

((~~3. One of the following applies:~~))

((~~3.1~~)) 3. In Group R-2 or R-3 buildings containing dwelling units, the top of the sill of the window opening is at a height less than 36 inches (915 mm) above the finished floor.

((~~3.2. In one- and two-family dwellings and townhouses regulated by the *International Residential Code*, the top sill of the window opening is at a height less than 24 inches (610 mm) above the finished floor.~~))

4. The window will permit openings that will allow passage of a 4-inch-diameter (102 mm) sphere when the window is in its largest opened position.
5. The vertical distance from the top of the sill of the window opening to the finished grade or other surface below, on the exterior of the building, is greater than 72 inches (1829 mm).

The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by Section 1030.2 of the *International Building Code*.

Exceptions:

1. Operable windows where the top of the sill of the window opening is located more than 75 feet (22 860 mm) above the finished grade or other surface below, on the exterior of the room, space or building, and that are provided with window fall prevention devices that comply with ASTM F2006.
2. Operable windows with openings that are provided with window fall prevention devices that comply with ASTM F2090.

[S] 702.5 Replacement window emergency escape and rescue openings. Where windows are required to provide emergency escape and rescue openings in Group R-2 and R-3 occupancies, ((~~and one- and two-family dwellings and townhouses regulated by the *International Residential Code*,~~)) replacement windows shall be exempt from the requirements of Sections 1030.2, 1030.3 and 1030.4 of the *International Building Code*, ((~~and Sections R310.2.1, R310.2.2 and R310.2.3 of the *International Residential Code*,~~)) provided that the replacement window meets the following conditions:

1. The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening.
2. The replacement window is not part of a *change of occupancy*.

Window opening control devices complying with ASTM F2090 shall be permitted for use on windows required to provide *emergency escape* and *rescue openings*.

[S] 702.6 Materials and methods. New work shall comply with the materials and methods requirements in the *International Building Code, International Energy Conservation Code, International Mechanical Code, and* ((~~*International*~~)) *Uniform Plumbing Code,* as applicable, that specify material standards, detail of installation and connection, joints, penetrations, and continuity of any element, component, or system in the building.

[FG] 702.6.1 International Fuel Gas Code. The following sections of the *International Fuel Gas Code* shall constitute the fuel gas materials and methods requirements for Level 1 *alterations*.

1. Chapter 3, entitled "General Regulations," except Sections 303.7 and 306.
2. Chapter 4, entitled "Gas Piping Installations," except Sections 401.8 and 402.3.
   - 2.1. Sections 401.8 and 402.3 shall apply where the work being performed increases the load on the system such that the existing pipe does not meet the size required by code. Existing systems that are modified shall not require resizing as long as the load on the system is not increased and the system length is not increased even if the altered system does not meet code minimums.
3. Chapter 5, entitled "Chimneys and Vents."
4. Chapter 6, entitled "Specific Appliances."

SECTION 703
FIRE PROTECTION

703.1 General. *Alterations* shall be done in a manner that maintains the level of fire protection provided.

SECTION 704
MEANS OF EGRESS

704.1 General. *Alterations* shall be done in a manner that maintains the level of protection provided for the means of egress.

[S] ((~~SECTION 705~~
~~REROOFING~~))

[S] ((~~SECTION 706~~
~~STRUCTURAL~~

~~**[BS] 706.1 General.** Where *alteration* work includes replacement of equipment that is supported by the building or where a reroofing permit is required, the provisions of this section shall apply.~~

~~**[BS] 706.2 Addition or replacement of roofing or replacement of equipment.** Any existing gravity load-carrying structural element for which an *alteration* causes an increase in design dead, live or snow load, including snow drift effects, of more than 5~~

~~percent shall be replaced or altered as needed to carry the gravity loads required by the *International Building Code* for new structures.~~

~~**Exceptions:**~~

1. ~~Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes where the altered building complies with the conventional light-frame construction methods of the *International Building Code* or the provisions of the *International Residential Code*.~~
2. ~~Buildings in which the increased dead load is due entirely to the addition of a second layer of roof covering weighing 3 pounds per square foot (0.1437 kN/m^2) or less over an existing single layer of roof covering.~~

~~**[BS] 706.3 Additional requirements for reroof permits.** The requirements of this section shall apply to *alteration* work requiring reroof permits.~~

~~**[BS] 706.3.1 Bracing for unreinforced masonry bearing wall parapets.** Where a permit is issued for reroofing for more than 25 percent of the roof area of a building assigned to Seismic Design Category D, E or F that has parapets constructed of unreinforced masonry, the work shall include installation of parapet bracing unless an evaluation demonstrates compliance of such items. Reduced seismic forces shall be permitted.~~

~~**[BS] 706.3.2 Roof diaphragms resisting wind loads in high wind regions.** Where roofing materials are removed from more than 50 percent of the roof diaphragm or section of a building located where the ultimate design wind speed, V_{ult}, determined in accordance with Figure 1609.3(1) of the *International Building Code*, is greater than 115 mph (51 m/s) or in a special wind region, as defined in Section 1609 of the *International Building Code*, roof diaphragms, connections of the roof diaphragm to roof framing members, and roof-to-wall connections shall be evaluated for the wind loads specified in the *International Building Code*, including wind uplift. If the diaphragms and connections in their current condition are not capable of resisting 75 percent of those wind loads, they shall be replaced or strengthened in accordance with the loads specified in the *International Building Code*.~~))

[S] ((~~SECTION 707~~
~~ENERGY CONSERVATION~~

~~**707.1 Minimum requirements.** Level 1 *alterations* to *existing buildings* or structures do not require the entire building or structure to comply with the energy requirements of the *International Energy Conservation Code* or *International Residential Code*. The *alterations* shall conform to the energy requirements of the *International Energy Conservation Code* or *International Residential Code* as they relate to new construction only.~~))

CHAPTER 8

ALTERATIONS—LEVEL 2

User note:

About this chapter: *Like Chapter 7, the purpose of this chapter is to provide detailed requirements and provisions to identify the required improvements in the existing building elements, building spaces and building structural system when a building is being altered. This chapter is distinguished from Chapters 7 and 9 by involving space reconfiguration that could be up to and including 50 percent of the area of the building. In contrast, Level 1 alterations (Chapter 7) do not involve space reconfiguration, and Level 3 alterations (Chapter 9) involve extensive space reconfiguration that exceeds 50 percent of the building area. Depending on the nature of alteration work, its location within the building, and whether it encompasses one or more tenants, improvements and upgrades could be required for the open floor penetrations, sprinkler system or the installation of additional means of egress such as stairs or fire escapes.*

SECTION 801
GENERAL

801.1 Scope. Level 2 *alterations* as described in Section 603 shall comply with the requirements of this chapter.

Exception: Buildings in which the reconfiguration is exclusively the result of compliance with the accessibility requirements of Section 305.7 shall be permitted to comply with Chapter 7.

801.2 Alteration Level 1 compliance. In addition to the requirements of this chapter, all work shall comply with the requirements of Chapter 7.

[S] 801.3 Compliance. New construction elements, components, systems, and spaces shall comply with the requirements of the *International Building Code.*

Exceptions:

1. Where windows are added they are not required to comply with the light and ventilation requirements of the *International Building Code.*

((~~2. Newly installed electrical equipment shall comply with the requirements of Section 807.~~

~~3~~)) 2. The length of dead-end corridors in newly constructed spaces shall only be required to comply with the provisions of Section 805.6.

((~~4~~)) 3. The minimum ceiling height of the newly created habitable and occupiable spaces and corridors shall be 7 feet (2134 mm).

((~~5~~)) 4. Where provided in below-grade transportation stations, existing and new escalators shall be permitted to have a clear width of no less than 32 inches (815 mm).

((~~6~~)) 5. New structural members and connections shall be permitted to comply with alternative design criteria in accordance with Section 302.

6. Automatic sprinkler systems are required when new dwelling units are added to buildings according to Items 6.1 through 6.6 below. This exception is permitted to be used to add one unit after October 29, 1990.

6.1 One unit is permitted to be added to a residential or commercial building without an automatic sprinkler system unless sprinklers are otherwise required by this section. If more than one unit is added, the new units shall be equipped with a sprinkler system.

6.2 In buildings that do not comply with the provisions of this code for number of stories, allowable area, height or type of construction before the unit is added, an automatic sprinkler system shall be provided in the new unit. The addition of the new unit shall not be allowed if it increases the nonconformity.

6.3 In buildings undergoing *substantial alteration*, an automatic sprinkler system shall be installed where required by this code for new construction.

6.4 One unit is permitted to be added to an existing duplex without an automatic sprinkler system where both of the following conditions are met:

6.4.1 The project is considered a *substantial alteration* only because of the change in occupancy; and

6.4.2 The building complies with the requirements for building height and number of stories for a Group R-2 occupancy.

6.5 Where one unit is added to an existing duplex, sprinklers are required in the new unit and not in the existing units where all of the following conditions are met:

6.5.1 The existing duplex does not comply with the requirements for building height and story count for a Group R-2 occupancy;

6.5.2 The project is considered a *substantial alteration* only because of the change in occupancy;

6.5.3 The new unit is constructed as an addition to the duplex;

6.5.4 The new unit is separated from the existing duplex by a fire wall; and

6.5.5 The addition by itself complies with the requirements for a Group R-2 occupancy.

6.6 A sprinkler system is not required when a Group U occupancy that is accessory to a Group R-3 occupancy is converted to a dwelling unit.

7. Ceilings in basements are permitted to project to within 6 feet 8 inches (2032 mm) of the finished floor, and beams, girders, ducts or other obstructions are permitted to project to within 6 feet 4 inches (1931 mm) of the finished floor.

8. Ceiling height in buildings in existence prior to October 17, 1979, shall be permitted to comply with rules promulgated by the *code official.*

SECTION 802
BUILDING ELEMENTS AND MATERIALS

802.1 Scope. The requirements of this section are limited to *work areas* in which Level 2 *alterations* are being performed and shall apply beyond the work area where specified.

802.2 Vertical openings. Existing vertical openings shall comply with the provisions of Sections 802.2.1, 802.2.2 and 802.2.3.

[S] 802.2.1 Existing vertical openings. Existing interior vertical openings connecting two or more floors shall be enclosed with *approved* assemblies having a fire-resistance rating of not less than 1 hour with *approved* opening protectives.

Exceptions:

1. Where vertical opening enclosure is not required by the *International Building Code* or the *International Fire Code*.
2. Interior vertical openings other than stairways may be blocked at the floor and ceiling of the *work area* by installation of not less than 2 inches (51 mm) of solid wood or equivalent construction.
3. The enclosure shall not be required where:
   - 3.1. Connecting the main floor and mezzanines; or
   - 3.2. All of the following conditions are met:
     - 3.2.1. The communicating area has a low-hazard occupancy or has a moderate-hazard occupancy that is protected throughout by an automatic sprinkler system.
     - 3.2.2. The lowest or next-to-the-lowest level is a street floor.
     - 3.2.3. The entire area is open and unobstructed in a manner such that it is reasonable to assume that a fire in any part of the interconnected spaces will be readily obvious to all of the occupants.
     - 3.2.4. Exit capacity is sufficient to provide egress simultaneously for all occupants of all levels by considering all areas to be a single floor area for the determination of required exit capacity.
     - 3.2.5. Each floor level, considered separately, has not less than one-half of its individual required exit capacity provided by an exit or exits leading directly out of that level without having to traverse another communicating floor level or be exposed to the smoke or fire spreading from another communicating floor level.
4. In Group A occupancies, a minimum 30-minute enclosure shall be provided to protect all vertical openings not exceeding three stories.
5. In Group B occupancies, a minimum 30-minute enclosure shall be provided to protect all vertical openings not exceeding three stories. This enclosure, or the enclosure specified in Section 802.2.1, shall not be required in the following locations:
   - 5.1. Buildings not exceeding 3,000 square feet (279 m^2) per floor.
   - 5.2. Buildings protected throughout by an *approved* automatic fire sprinkler system.
6. In Group E occupancies, the enclosure shall not be required for vertical openings not exceeding three stories where the building is protected throughout by an *approved* automatic fire sprinkler system.
7. In Group F occupancies, the enclosure shall not be required in the following locations:
   - 7.1. Vertical openings not exceeding three stories.
   - 7.2. Special-purpose occupancies where necessary for manufacturing operations and direct access is provided to not fewer than one protected stairway.
   - 7.3. Buildings protected throughout by an *approved* automatic sprinkler system.

8. In Group H occupancies, the enclosure shall not be required for vertical openings not exceeding three stories where necessary for manufacturing operations and every floor level has direct access to not fewer than two remote enclosed stairways or other *approved* exits.
9. In Group M occupancies, a minimum 30-minute enclosure shall be provided to protect all vertical openings not exceeding three stories. This enclosure, or the enclosure specified in Section 802.2.1, shall not be required in the following locations:
   9.1. Openings connecting only two floor levels.
   9.2. Occupancies protected throughout by an *approved* automatic sprinkler system.
10. In Group R-1 occupancies, the enclosure shall not be required for vertical openings not exceeding three stories in ((~~the following locations: 10.1. Buildings~~)) buildings protected throughout by an *approved* automatic sprinkler system.
    ((~~10.2. Buildings with less than 25 dwelling units or sleeping units where every sleeping room above the second floor is provided with direct access to a fire escape or other *approved* second exit by means of an *approved* exterior door or window having a sill height of not greater than 44 inches (1118 mm) and where both of the following conditions are met:~~
    ~~10.2.1. Any exit access corridor exceeding 8 feet (2438 mm) in length that serves two means of egress, one of which is an unprotected vertical opening, shall have not fewer than one of the means of egress separated from the vertical opening by a 1-hour fire barrier.~~
    ~~10.2.2. The building is protected throughout by an automatic fire alarm system, installed and supervised in accordance with the *International Building Code*.~~))
11. In Group R-2 occupancies, a minimum 30-minute enclosure shall be provided to protect all vertical openings not exceeding three stories. This enclosure, or the enclosure specified in Section 802.2.1, shall not be required in the following locations:
    11.1. Vertical openings not exceeding two stories with not more than four dwelling units per floor.
    11.2. Buildings protected throughout by an *approved* automatic sprinkler system.
    ((~~11.3. Buildings with not more than four dwelling units per floor where every sleeping room above the second floor is provided with direct access to a fire escape or other *approved* second exit by means of an *approved* exterior door or window having a sill height of not greater than 44 inches (1118 mm) and the building is protected throughout by an automatic fire alarm system complying with Section 803.4.~~
12. ~~One- and two-family dwellings.~~

~~13~~)) 12. Group S occupancies where connecting not more than two floor levels or where connecting not more than three floor levels and the structure is equipped throughout with an *approved* automatic sprinkler system.

((~~14~~)) 13. Group S occupancies where vertical opening protection is not required for open parking garages and ramps.

802.2.2 Supplemental shaft and floor opening enclosure requirements. Where the *work area* on any floor exceeds 50 percent of that floor area, the enclosure requirements of Section 802.2 shall apply to vertical openings other than stairways throughout the floor.

Exception: Vertical openings located in tenant spaces that are entirely outside the *work area*.

802.2.3 Supplemental stairway enclosure requirements. Where the *work area* on any floor exceeds 50 percent of that floor area, stairways that are part of the means of egress serving the *work area* shall, at a minimum, be enclosed with smoke-tight construction on the highest *work area* floor and all floors below.

Exception: Where stairway enclosure is not required by the *International Building Code* or the *International Fire Code*.

802.3 Smoke compartments. In Group I-2 occupancies where the *work area* is on a story used for sleeping rooms for more than 30 patients, the story shall be divided into not less than two compartments by smoke barrier walls in accordance with Section 407.5 of the *International Building Code* as required for new construction.

802.4 Interior finish. The interior finish of walls and ceilings in exits and corridors in any *work area* shall comply with the requirements of the *International Building Code*.

Exception: Existing interior finish materials that do not comply with the interior finish requirements of the *International Building Code* shall be permitted to be treated with an *approved* fire-retardant coating in accordance with the manufacturer's instructions to achieve the required rating.

802.4.1 Supplemental interior finish requirements. Where the *work area* on any floor exceeds 50 percent of the floor area, Section 802.4 shall apply to the interior finish in exits and corridors serving the *work area* throughout the floor.

Exception: Interior finish within tenant spaces that are entirely outside the *work area*.

802.5 Guards. The requirements of Sections 802.5.1 and 802.5.2 shall apply in all *work areas*.

802.5.1 Minimum requirement. Every portion of a floor, such as a balcony or a loading dock, that is more than 30 inches (762 mm) above the floor or grade below and is not provided with guards, or those in which the existing guards are judged to be in danger of collapsing, shall be provided with guards.

802.5.2 Design. Where there are no guards or where existing guards must be replaced, the guards shall be designed and installed in accordance with the *International Building Code*.

802.6 Fire-resistance ratings. Where *approved* by the *code official*, buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code* has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. The building is required to meet the other applicable requirements of the *International Building Code*.

Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the *code official* to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features, including fire-resistance-rated assemblies and smoke-resistive assemblies, conditions of occupancy, means-of-egress conditions, fire code deficiencies, *approved* modifications or *approved* alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.

SECTION 803
FIRE PROTECTION

[S] 803.1 Scope. The requirements of this section shall be limited to *work areas* in which Level 2 *alterations* are being performed, and where specified they shall apply throughout the floor on which the *work areas* are located or otherwise beyond the *work area*.

Exception: The fire *code official* may modify or waive the fire protection requirements for Level 2 *alteration* projects in which the fire protection requirements constitute an excessive burden.

803.1.1 Corridor ratings. Where an *approved* automatic sprinkler system is installed throughout the story, the required fire-resistance rating for any corridor located on the story shall be permitted to be reduced in accordance with the *International Building Code*. In order to be considered for a corridor rating reduction, such system shall provide coverage for the stairway landings serving the floor and the intermediate landings immediately below.

803.2 Automatic sprinkler systems. Automatic sprinkler systems shall be provided in accordance with the requirements of Sections 803.2.1 through 803.2.4. Installation requirements shall be in accordance with the *International Building Code*.

803.2.1 High-rise buildings. In high-rise buildings, *work areas* that have exits or corridors shared by more than one tenant or that have exits or corridors serving an occupant load greater than 30 shall be provided with automatic sprinkler protection in the entire *work area* where the *work area* is located on a floor that has a sufficient sprinkler water supply system from an existing standpipe or a sprinkler riser serving that floor.

803.2.1.1 Supplemental automatic sprinkler system requirements. Where the *work area* on any floor exceeds 50 percent of that floor area, Section 803.2.1 shall apply to the entire floor on which the *work area* is located.

Exception: Occupied tenant spaces that are entirely outside the *work area*.

[S] 803.2.2 Groups A, B, E, F-1, H, I, M, R-1, R-2, ((~~R-4,~~)) S-1 and S-2. In buildings with occupancies in Groups A, B, E, F-1, H, I, M, R-1, R-2, ((~~R-4,~~)) S-1 and S-2, *work areas* that have exits or corridors shared by more than one tenant or that have exits or corridors serving an occupant load greater than 30 shall be provided with automatic sprinkler protection where both of the following conditions occur:

1. The *work area* is required to be provided with automatic sprinkler protection in accordance with the *International Building Code* as applicable to new construction.
2. The *work area* exceeds 50 percent of the floor area.

Exception: If the building does not have sufficient municipal water supply for design of a fire sprinkler system available to the floor without installation of a new fire pump, *work areas* shall be protected by an automatic smoke detection system throughout all occupiable spaces other than sleeping units or individual dwelling units that activates the occupant notification system in accordance with Sections 907.4, 907.5 and 907.6 of the *International Building Code*.

803.2.2.1 Mixed uses. In *work areas* containing mixed uses, one or more of which requires automatic sprinkler protection in accordance with Section 803.2.2, such protection shall not be required throughout the *work area* provided that the uses requiring such protection are separated from those not requiring protection by fire-resistance-rated construction having a minimum 2-hour rating for Group H and a minimum 1-hour rating for all other occupancy groups.

803.4.1.6 Group R-2. A fire alarm system shall be installed in *work areas* of Group R-2 apartment buildings as required by the *International Fire Code* for existing Group R-2 occupancies.

803.4.2 Supplemental fire alarm system requirements. Where the *work area* on any floor exceeds 50 percent of that floor area, Section 803.4.1 shall apply throughout the floor.

Exception: Alarm-initiating and notification appliances shall not be required to be installed in tenant spaces outside of the *work area*.

803.4.3 Smoke alarms. Individual sleeping units and individual dwelling units in any *work area* in Group R and I-1 occupancies shall be provided with smoke alarms in accordance with the *International Fire Code*.

Exception: Interconnection of smoke alarms outside of the *work area* shall not be required.

SECTION 804
CARBON MONOXIDE DETECTION

804.1 Carbon monoxide alarms. Any *work area* in Group I-1, I-2, I-4 and R occupancies shall be equipped with carbon monoxide alarms in accordance with Section 1103.9 of the *International Fire Code*.

Exceptions:

1. Work involving the exterior surfaces of buildings, such as the replacement of roofing or siding, the addition or replacement of windows or doors, or the addition of porches or decks.
2. Installation, alteration or *repairs* of plumbing or mechanical systems, other than fuel-burning appliances.

SECTION 805
MEANS OF EGRESS

805.1 Scope. The requirements of this section shall be limited to *work areas* that include exits or corridors shared by more than one tenant within the *work area* in which Level 2 *alterations* are being performed, and where specified they shall apply throughout the floor on which the *work areas* are located or otherwise beyond the *work area*.

805.2 General. The means of egress shall comply with the requirements of this section.

Exceptions:

1. Where the *work area* and the means of egress serving it complies with NFPA 101.
2. Means of egress complying with the requirements of the building code under which the building was constructed shall be considered to be compliant means of egress if, in the opinion of the *code official*, they do not constitute a distinct hazard to life.

805.3 Number of exits. The number of exits shall be in accordance with Sections 805.3.1 through 805.3.3.

805.3.1 Minimum number. Every story utilized for human occupancy on which there is a *work area* that includes exits or corridors shared by more than one tenant within the *work area* shall be provided with the minimum number of exits based on the occupancy and the occupant load in accordance with the *International Building Code*. In addition, the exits shall comply with Sections 805.3.1.1 and 805.3.1.2.

[S] 805.3.1.1 Single-exit buildings. A single exit or access to a single exit shall be permitted from spaces, any story or any occupied roof where one of the following conditions exists:

1. The occupant load, number of dwelling units and exit access travel distance do not exceed the values in Table 805.3.1.1(1) or 805.3.1.1(2).
2. In Group R-1 or R-2, nonsprinklered buildings, individual single-story or multiple-story dwelling or sleeping units shall be permitted to have a single exit or access to a single exit from the dwelling or sleeping unit provided one of the following criteria are met:
   - 2.1. The occupant load is not greater than 10 and the exit access travel distance within the unit does not exceed 75 feet (22 860 mm).
   - 2.2. The building is not more than three stories in height; all third-story space is part of dwelling with an exit access doorway on the second story; and the portion of the exit access travel distance from the door to any habitable room within any such unit to the unit entrance doors does not exceed 50 feet (15 240 mm).
3. In buildings of Group R-2 occupancy of any number of stories with not more than four dwelling units per floor served by an interior exit stairway; with a smokeproof enclosure in accordance with Sections 909.20 and 1023.11 of the *International Building Code* or an exterior stairway as an exit; and where the portion of the exit access travel distance from the dwelling unit entrance door to the exit is not greater than 20 feet (6096 mm).
4. In Group R-2 and R-3 occupancies, one means of egress is permitted within and from individual dwelling units with a maximum occupant load of 20 where the dwelling unit is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code*.

TABLE 805.3.1.1(1)
STORIES WITH ONE EXIT OR ACCESS TO ONE EXIT
FOR R-2 OCCUPANCIES

STORY	OCCUPANCY	MAXIMUM NUMBER OF DWELLING UNITS	MAXIMUM EXIT ACCESS TRAVEL DISTANCE (feet)
Basement, first or second story above grade plane	R-2[a]	4 dwelling units	50
Third story above grade plane and higher	NP	NA	NA

For SI: 1 foot = 304.8 mm.
NP = Not Permitted.
NA = Not Applicable.
a. Group R-2, nonsprinklered and provided with emergency escape and rescue openings in accordance with Section 1030 of the *International Building Code*.

TABLE 805.3.1.1(2)
STORIES WITH ONE EXIT OR ACCESS TO ONE EXIT
FOR OTHER OCCUPANCIES

STORY	OCCUPANCY	MAXIMUM OCCUPANT LOAD PER STORY	MAXIMUM EXIT ACCESS TRAVEL DISTANCE (feet)
First story above or below grade plane	B, F-2, S-2[a]	35	75
Second story above grade plane	B, F-2, S-2[a]	35	75
Third story above grade plane and higher	NP	NA	NA

For SI: 1 foot = 304.8 mm.
NP = Not Permitted.
NA = Not Applicable.
a. The length of exit access travel distance in a Group S-2 open parking garage shall be not more than 100 feet.

[S] 805.3.1.2 Fire escapes. ((~~**required.** For other than Group I-2, where more than one exit is required, an existing or newly constructed fire escape complying with Section 805.3.1.2.1 shall be accepted as providing one of the required means of egress.~~)) Fire escapes that are altered shall comply with this section. Existing fire escapes shall continue to be accepted as a component in the means of egress in *existing buildings* only.

[S] ((~~805.3.1.2.1 Fire escape access and details.~~ ~~Fire escapes shall comply with all of the following requirements:~~

~~1. Occupants shall have unobstructed access to the fire escape without having to pass through a room subject to locking.~~

~~2. Access to a new fire escape shall be through a door, except that windows shall be permitted to provide access from single dwelling units or sleeping units in Group R-1, R-2 and I-1 occupancies or to provide access from spaces having a maximum occupant load of 10 in other occupancy classifications.~~

~~2.1. The window shall have a minimum net clear opening of 5.7 square feet (0.53 m²) or 5 square feet (0.46 m²) where located at grade.~~

~~2.2. The minimum net clear opening height shall be 24 inches (610 mm) and net clear opening width shall be 20 inches (508 mm).~~

~~2.3. The bottom of the clear opening shall not be greater than 44 inches (1118 mm) above the floor.~~

~~2.4. The operation of the window shall comply with the operational constraints of the *International Building Code*.~~

~~3. Newly constructed fire escapes shall be permitted only where exterior stairways cannot be utilized because of lot lines limiting the stairway size or because of the sidewalks, alleys, or roads at grade level.~~

~~4. Openings within 10 feet (3048 mm) of fire escape stairways shall be protected by fire assemblies having minimum 3/4-hour fire-resistance ratings.~~

~~**Exception:** Opening protection shall not be required in buildings equipped throughout with an *approved* automatic sprinkler system.~~

~~5. In all buildings of Group E occupancy, up to and including the 12th grade, buildings of Group I occupancy, rooming houses and childcare centers, ladders of any type are prohibited on fire escapes used as a required means of egress.~~))

[S] 805.3.1.2.1 Location. Where located on the front of the building and where projecting beyond the building line, the lowest landing shall be not less than 8 feet (2438 mm) or more than 12 feet (3658 mm) above grade, and shall be

equipped with a counterbalanced stairway to the street. In alleyways and thoroughfares less than 30 feet (9144 mm) wide, the clearance under the lowest landing shall be not less than 12 feet (3658 mm).

[S] 805.3.1.2.2 Construction. The fire escape shall be designed to support a live load of 100 pounds per square foot (4788 Pa) and shall be constructed of steel or other *approved noncombustible materials*. ((~~Fire escapes constructed of wood not less than nominal 2 inches (51 mm) thick are permitted on buildings of Type V construction. Walkways and railings located over or supported by combustible roofs in buildings of Types III and IV construction are permitted to be of wood not less than nominal 2 inches (51 mm) thick.~~))

805.3.1.2.3 Dimensions. Stairways shall be not less than 22 inches (559 mm) wide with risers not more than, and treads not less than, 8 inches (203 mm). Landings at the foot of stairways shall be not less than 40 inches (1016 mm) wide by 36 inches (914 mm) long and located not more than 8 inches (203 mm) below the door.

[S] 805.3.1.2.4 Opening protectives. Doors and windows along the fire escape shall be protected with 3/4-hour opening protectives.

805.3.2 Mezzanines. Mezzanines in the *work area* and with an occupant load of more than 50 or in which the travel distance to an exit exceeds 75 feet (22 860 mm) shall have access to not fewer than two independent means of egress.

Exception: Two independent means of egress are not required where the travel distance to an exit does not exceed 100 feet (30 480 mm) and the building is protected throughout with an automatic sprinkler system.

805.3.3 Main entrance—Group A. Buildings of Group A with an occupant load of 300 or more shall be provided with a main entrance capable of serving as the main exit with an egress capacity of not less than one-half of the total occupant load. The remaining exits shall be capable of providing one-half of the total required exit capacity.

Exception: Where a main exit is not well defined or where multiple main exits are provided, exits shall be permitted to be distributed around the perimeter of the building provided that the total width of egress is not less than 100 percent of the required width.

805.4 Egress doorways. Egress doorways in any *work area* shall comply with Sections 805.4.1 through 805.4.5.

805.4.1 Two egress doorways required. Work areas shall be provided with two egress doorways in accordance with the requirements of Sections 805.4.1.1 and 805.4.1.2.

805.4.1.1 Occupant load and travel distance. In any *work area*, all rooms and spaces having an occupant load greater than 50 or in which the travel distance to an exit exceeds 75 feet (22 860 mm) shall have not fewer than two egress doorways.

Exceptions:

1. Storage rooms having a maximum occupant load of 10.
2. Where the *work area* is served by a single exit in accordance with Section 805.3.1.1.

805.4.1.2 Group I-2. In buildings of Group I-2 occupancy, any patient sleeping room or suite of patient rooms greater than 1,000 square feet (93 m^2) within the *work area* shall have not fewer than two egress doorways.

805.4.2 Door swing. In the *work area* and in the egress path from any *work area* to the exit discharge, all egress doors serving an occupant load greater than 50 shall swing in the direction of exit travel.

805.4.2.1 Supplemental requirements for door swing. Where the *work area* exceeds 50 percent of the floor area, door swing shall comply with Section 805.4.2 throughout the floor.

Exception: Means of egress within or serving only a tenant space that is entirely outside the *work area*.

805.4.3 Door closing. In any *work area*, all doors opening onto an exit passageway at grade or an exit stairway shall be self-closing or automatic-closing by listed closing devices.

Exceptions:

1. Where exit enclosure is not required by the *International Building Code*.
2. Means of egress within or serving only a tenant space that is entirely outside the *work area*.

805.4.3.1 Supplemental requirements for door closing. Where the *work area* exceeds 50 percent of the floor area, doors shall comply with Section 805.4.3 throughout the exit stairway from the *work area* to, and including, the level of exit discharge.

805.4.4 Panic hardware. In any *work area*, and in the egress path from any *work area* to the exit discharge, in buildings or portions thereof of Group A assembly occupancies with an occupant load greater than 100, all required exit doors equipped with latching devices shall be equipped with *approved* panic hardware.

805.4.4.1 Supplemental requirements for panic hardware. Where the *work area* exceeds 50 percent of the floor area, panic hardware shall comply with Section 805.4.4 throughout the floor.

Exception: Means of egress within a tenant space that is entirely outside the *work area*.

805.7.2 Supplemental requirements for means-of-egress lighting. Where the *work area* on any floor exceeds 50 percent of that floor area, means of egress throughout the floor shall comply with Section 805.7.1.

Exception: Means of egress within or serving only a tenant space that is entirely outside the *work area*.

805.8 Exit signs. Exit signs shall be in accordance with this section, as applicable.

805.8.1 Work areas. Means of egress in all *work areas* shall be provided with exit signs in accordance with the requirements of the *International Building Code*.

805.8.2 Supplemental requirements for exit signs. Where the *work area* on any floor exceeds 50 percent of that floor area, means of egress throughout the floor shall comply with Section 805.8.1.

Exception: Means of egress within a tenant space that is entirely outside the *work area*.

805.9 Handrails. The requirements of Sections 805.9.1 and 805.9.2 shall apply to handrails from the *work area* floor to, and including, the level of exit discharge.

805.9.1 Minimum requirement. Every required exit stairway that is part of the means of egress for any *work area* and that has three or more risers and is not provided with not fewer than one handrail, or in which the existing handrails are judged to be in danger of collapsing, shall be provided with handrails for the full length of the stairway on not fewer than one side. Exit stairways with a required egress width of more than 66 inches (1676 mm) shall have handrails on both sides.

805.9.2 Design. Handrails required in accordance with Section 805.9.1 shall be designed and installed in accordance with the provisions of the *International Building Code*.

805.10 Refuge areas. Where *alterations* affect the configuration of an area utilized as a refuge area, the capacity of the refuge area shall not be reduced below that required in Sections 805.10.1 and 805.10.2.

805.10.1 Capacity. The required capacity of refuge areas shall be in accordance with Sections 805.10.1.1 through 805.10.1.3.

805.10.1.1 Group I-2. In Group I-2 occupancies, the required capacity of the refuge areas for smoke compartments in accordance with Section 407.5.1 of the *International Building Code* shall be maintained.

805.10.1.2 Group I-3. In Group I-3 occupancies, the required capacity of the refuge areas for smoke compartments in accordance with Section 408.6.2 of the *International Building Code* shall be maintained.

805.10.1.3 Ambulatory care. In ambulatory care facilities required to be separated by Section 422.2 of the *International Building Code*, the required capacity of the refuge areas for smoke compartments in accordance with Section 422.3.2 of the *International Building Code* shall be maintained.

805.10.2 Horizontal exits. The required capacity of the refuge area for horizontal exits in accordance with Section 1026.4 of the *International Building Code* shall be maintained.

805.11 Guards. The requirements of Sections 805.11.1 and 805.11.2 shall apply to guards from the *work area* floor to, and including, the level of exit discharge but shall be confined to the egress path of any *work area*.

805.11.1 Minimum requirement. Every open portion of a stairway, landing, or balcony that is more than 30 inches (762 mm) above the floor or grade below and is not provided with guards, or those portions in which existing guards are judged to be in danger of collapsing, shall be provided with guards.

805.11.2 Design. Guards required in accordance with Section 805.11.1 shall be designed and installed in accordance with the *International Building Code*.

SECTION 806
STRUCTURAL

[S][BS] 806.1 General. Structural elements and systems within buildings undergoing Level 2 *alterations* shall comply with ((~~this section~~)) Section 303.

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[S] ((~~SECTION 807~~
~~ELECTRICAL~~

~~**807.1 New installations.** Newly installed electrical equipment and wiring relating to work done in any *work area* shall comply with all applicable requirements of NFPA 70 except as provided for in Section 807.3.~~

~~**807.2 Existing installations.** Existing wiring in all *work areas* in Group A-1, A-2, A-5, H and I occupancies shall be upgraded to meet the materials and methods requirements of Chapter 7.~~

~~**807.3 Residential occupancies.** In Group R-2, R-3 and R-4 occupancies and buildings regulated by the *International Residential Code*, the requirements of Sections 807.3.1 through 807.3.7 shall be applicable only to *work areas* located within a dwelling unit.~~

~~**807.3.1 Enclosed areas.** Enclosed areas, other than closets, kitchens, basements, garages, hallways, laundry areas, utility areas, storage areas and bathrooms shall have not fewer than two duplex receptacle outlets or one duplex receptacle outlet and one ceiling or wall-type lighting outlet.~~

~~**807.3.2 Kitchens.** Kitchen areas shall have not fewer than two duplex receptacle outlets.~~

~~**807.3.3 Laundry areas.** Laundry areas shall have not fewer than one duplex receptacle outlet located near the laundry equipment and installed on an independent circuit.~~

~~**807.3.4 Ground-fault circuit-interruption.** Newly installed receptacle outlets shall be provided with ground-fault circuit interruption as required by NFPA 70.~~

~~**807.3.5 Minimum lighting outlets.** Not fewer than one lighting outlet shall be provided in every bathroom, hallway, stairway, attached garage, and detached garage with electric power, and to illuminate outdoor entrances and exits.~~

~~**807.3.6 Utility rooms and basements.** Not fewer than one lighting outlet shall be provided in utility rooms and basements where such spaces are used for storage or contain equipment requiring service.~~

~~**807.3.7 Clearance for equipment.** Clearance for electrical service equipment shall be provided in accordance with the NFPA 70.~~))

SECTION 808
MECHANICAL

[S] ((~~**808.1 Reconfigured or converted spaces.** Reconfigured spaces intended for occupancy and spaces converted to habitable or occupiable space in any *work area* shall be provided with natural or mechanical ventilation in accordance with the *International Mechanical Code*.~~

~~**Exception:** Existing mechanical ventilation systems shall comply with the requirements of Section 808.2.~~))

808.1 Mechanical systems. Mechanical systems shall comply with the *International Mechanical Code*.

[S] ((~~**808.2 Altered existing systems.** In mechanically ventilated spaces, existing mechanical ventilation systems that are altered, reconfigured, or extended shall provide not less than 5 cubic feet per minute (cfm) (0.0024 m^3/s) per person of outdoor air and not less than 15 cfm (0.0071 m^3/s) of ventilation air per person; or not less than the amount of ventilation air determined by the Indoor Air Quality Procedure of ASHRAE 62.1.~~))

[S] ((~~**808.3 Local exhaust.** Newly introduced devices, equipment, or operations that produce airborne particulate matter, odors, fumes, vapor, combustion products, gaseous contaminants, pathogenic and allergenic organisms, and microbial contaminants in such quantities as to affect adversely or impair health or cause discomfort to occupants shall be provided with local exhaust.~~))

SECTION 809
PLUMBING

[S] 809.1 Minimum fixtures. Where the occupant load of the story is increased by more than 20 percent, plumbing fixtures for the story shall be provided in quantities specified in the *International* ((~~*Plumbing*~~)) *Building Code* based on the increased occupant load.

[S] ((~~SECTION 810~~
~~ENERGY CONSERVATION~~

~~**810.1 Minimum requirements.** Level 2 *alterations* to *existing buildings* or structures are permitted without requiring the entire building or structure to comply with the energy requirements of the *International Energy Conservation Code* or *International Residential Code*. The *alterations* shall conform to the energy requirements of the *International Energy Conservation Code* or *International Residential Code* as they relate to new construction only.~~))

CHAPTER 9

ALTERATIONS—LEVEL 3

User note:

About this chapter: *Chapter 9 provides the technical requirements for those existing buildings that undergo Level 3 alterations. The purpose of this chapter is to provide detailed requirements and provisions to identify the required improvements in the existing building elements, building spaces and building structural system. This chapter is distinguished from Chapters 7 and 8 by involving alterations that cover 50 percent or more of the aggregate area of the building. In contrast, Level 1 alterations do not involve space reconfiguration, and Level 2 alterations involve extensive space reconfiguration that does not exceed 50 percent of the building area. Depending on the nature of alteration work, its location within the building, and whether it encompasses one or more tenants, improvements and upgrades could be required for the open floor penetrations, sprinkler system or the installation of additional means of egress such as stairs or fire escapes. At times and under certain situations, this chapter also is intended to improve the safety of certain building features beyond the work area and in other parts of the building where no alteration work might be taking place.*

SECTION 901
GENERAL

901.1 Scope. Level 3 *alterations* as described in Section 604 shall comply with the requirements of this chapter.

901.2 Compliance. In addition to the provisions of this chapter, work shall comply with all of the requirements of Chapters 7 and 8. The requirements of Sections 802, 803, 804, and 805 shall apply within all *work areas* whether or not they include exits and corridors shared by more than one tenant and regardless of the occupant load.

Exception: Buildings in which the reconfiguration of space affecting exits or shared egress access is exclusively the result of compliance with the accessibility requirements of Section 305.7 shall not be required to comply with this chapter.

SECTION 902
SPECIAL USE AND OCCUPANCY

[S] 902.1 High-rise buildings. Any building having occupied floors more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access shall comply with the requirements of ((~~Sections~~)) Section 902.1.1. ((~~and 902.1.2.~~))

902.1.1 Recirculating air or exhaust systems. Where a floor is served by a recirculating air or exhaust system with a capacity greater than 15,000 cubic feet per minute (701 m^3/s), that system shall be equipped with *approved* smoke and heat detection devices installed in accordance with the *International Mechanical Code*.

((~~**902.1.2 Elevators.** Where there is an elevator or elevators for public use, not fewer than one elevator serving the *work area* shall comply with this section. Existing elevators with a travel distance of 25 feet (7620 mm) or more above or below the main floor or other level of a building and intended to serve the needs of emergency personnel for fire-fighting or rescue purposes shall be provided with emergency operation in accordance with ASME A17.3. New elevators shall be provided with Phase I emergency recall operation and Phase II emergency in-car operation in accordance with ASME A17.1/CSAB44.1.~~))

[S] 902.2 Boiler and furnace equipment rooms. Boiler and furnace equipment rooms adjacent to or within Group I-1, I-2, I-4, R-1, and R-2 ((~~and R-4~~)) occupancies shall be enclosed by 1-hour fire-resistance-rated construction.

Exceptions:

1. Steam boiler equipment operating at pressures of 15 pounds per square inch gauge (psig) (103.4 kPa) or less is not required to be enclosed.
2. Hot water boilers operating at pressures of 170 psig (1171 kPa) or less are not required to be enclosed.
3. Furnace and boiler equipment with 400,000 British thermal units (Btu) (4.22 × 108 J) per hour input rating or less is not required to be enclosed.
4. Furnace rooms protected with an automatic sprinkler system are not required to be enclosed.

SECTION 903
BUILDING ELEMENTS AND MATERIALS

903.1 Existing shafts and vertical openings. Existing stairways that are part of the means of egress shall be enclosed in accordance with Section 802.2.1 from the highest *work area* floor to, and including, the level of exit discharge and all floors below.

903.2 Fire partitions in Group R-3. Fire separation in Group R-3 occupancies shall be in accordance with Section 903.2.1.

[S] 903.2.1 Separation required. Where the *work area* is in any attached dwelling unit in Group R-3 or any multiple single-family dwelling (townhouse), walls separating the dwelling units that are not continuous from the foundation to the underside of the roof sheathing shall be constructed to provide a continuous fire separation using construction materials consistent with the existing wall or complying with the requirements for new structures. Work shall be performed on the side of the dwelling unit wall that is part of the *work area*.

Exception: Where *alterations* ((~~or *repairs*~~)) do not result in the removal of wall or ceiling finishes exposing the structure, walls are not required to be continuous through concealed floor spaces.

903.3 Interior finish. Interior finish in exits serving the *work area* shall comply with Section 802.4 between the highest floor on which there is a *work area* to the floor of exit discharge.

SECTION 904
FIRE PROTECTION

904.1 Automatic sprinkler systems. An automatic sprinkler system shall be provided in a *work area* where required by Section 803.2 or this section.

904.1.1 High-rise buildings. An automatic sprinkler system shall be provided in *work areas* where the high-rise building has a sufficient municipal water supply for the design and installation of an automatic sprinkler system at the site.

904.1.2 Rubbish and linen chutes. Rubbish and linen chutes located in the *work area* shall be provided with automatic sprinkler system protection or an *approved* automatic fire-extinguishing system where protection of the rubbish and linen chute would be required under the provisions of the *International Building Code* for new construction.

904.1.3 Upholstered furniture or mattresses. *Work areas* shall be provided with an automatic sprinkler system in accordance with the *International Building Code* where any of the following conditions exist:

1. A Group F-1 occupancy used for the manufacture of upholstered furniture or mattresses exceeds 2,500 square feet (232 m^2).
2. A Group M occupancy used for the display and sale of upholstered furniture or mattresses exceeds 5,000 square feet (464 m^2).
3. A Group S-1 occupancy used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m^2).

** **904.1.4 Other required automatic sprinkler systems.** In buildings and areas listed in Table 903.2.11.6 of the *International Building Code*, *work areas* that have exits or corridors shared by more than one tenant or that have exits or corridors serving an occupant load greater than 30 shall be provided with an automatic sprinkler system under the following conditions:

1. The *work area* is required to be provided with an automatic sprinkler system in accordance with the *International Building Code* applicable to new construction.
2. The building site has sufficient municipal water supply for design and installation of an automatic sprinkler system.

904.2 Fire alarm and detection systems. Fire alarm and detection shall be provided in accordance with Section 907 of the *International Building Code* as required for new construction.

904.2.1 Manual fire alarm systems. Where required by the *International Building Code*, a manual fire alarm system shall be provided throughout the *work area*. Alarm notification appliances shall be provided on such floors and shall be automatically activated as required by the *International Building Code*.

Exceptions:

1. Alarm-initiating and notification appliances shall not be required to be installed in tenant spaces outside of the *work area*.
2. Visual alarm notification appliances are not required, except where an existing alarm system is upgraded or replaced or where a new fire alarm system is installed.

904.2.2 Automatic fire detection. Where required by the *International Building Code* for new buildings, automatic fire detection systems shall be provided throughout the *work area*.

SECTION 905
MEANS OF EGRESS

905.1 General. The means of egress shall comply with the requirements of Section 805 except as specifically required in Sections 905.2 and 905.3.

905.2 Means-of-egress lighting. Means of egress from the highest *work area* floor to the floor of exit discharge shall be provided with artificial lighting within the exit enclosure in accordance with the requirements of the *International Building Code*.

905.3 Exit signs. Means of egress from the highest *work area* floor to the floor of exit discharge shall be provided with exit signs in accordance with the requirements of the *International Building Code*.

SECTION 906
STRUCTURAL

[S][BS] 906.1 General. Where buildings are undergoing Level 3 *alterations*, the provisions of ((~~this section~~)) Section 303 shall apply.

[S] ((~~[BS] 906.3 Seismic Design Category F.~~ ~~Where the building is assigned to Seismic Design Category F, the structure of the altered building shall meet the requirements of Sections 1609 and 1613 of the *International Building Code*. Reduced seismic forces shall be permitted.~~))

[S] ((~~[BS] 906.4. Anchorage for concrete and masonry buildings.~~ ~~For any building assigned to Seismic Design Category D, E or F with a structural system that includes concrete or reinforced masonry walls with a flexible roof diaphragm, the *alteration* work shall include installation of wall anchors at the roof line of all subject buildings and at the floor lines of unreinforced masonry buildings unless an evaluation demonstrates compliance of existing wall anchorage. Reduced seismic forces shall be permitted.~~))

[S] ((~~[BS] 906.6 Bracing for unreinforced masonry parapets.~~ ~~Parapets constructed of unreinforced masonry in buildings assigned to Seismic Design Category C, D, E or F shall have bracing installed as needed to resist the reduced *International Building Code* level seismic forces in accordance with Section 303.3, unless an evaluation demonstrates compliance of such items. Use of reduced seismic forces shall be permitted.~~))

[S] ((~~SECTION 907~~
~~ENERGY CONSERVATION~~

~~**907.1 Minimum requirements.** Level 3 *alterations* to *existing buildings* or structures are permitted without requiring the entire building or structure to comply with the energy requirements of the *International Energy Conservation Code* or *International Residential Code*. The *alterations* shall conform to the energy requirements of the *International Energy Conservation Code* or *International Residential Code* as they relate to new construction only.~~))

CHAPTER 10

CHANGE OF OCCUPANCY

User note:

About this chapter: *The purpose of this chapter is to provide regulations for the circumstances where an existing building is subject to a change of occupancy or a change of occupancy classification. A change of occupancy is not to be confused with a change of occupancy classification. The* International Building Code® *defines different occupancy classifications in Chapter 3 and special occupancy requirements in Chapter 4. Within specific occupancy classifications there can be many different types of actual activities that can take place. For instance, a Group A-3 occupancy classification deals with a wide variation of different types of activities, including bowling alleys and courtrooms, indoor tennis courts and dance halls. When a facility changes use from, for example, a bowling alley to a dance hall, the occupancy classification remains A-3, but the different uses could lead to drastically different code requirements. Therefore, this chapter deals with the special circumstances that are associated with a change in the use of a building within the same occupancy classification as well as a change of occupancy classification.*

SECTION 1001
GENERAL

[S] 1001.1 Scope. The provisions of this chapter shall apply where a *change of occupancy* occurs, as defined in Section 202.

Note: The following illustrate how change of occupancy is interpreted:

- Change of occupancy classification is a change in the letter designation. An example is a change from B occupancy to R occupancy.
- Change in occupancy group is change in the number designation within an occupancy classification. An example is a change from group R-1 occupancy to R-2 occupancy.
- Change of use is a change in the subcategory within the occupancy group. An example is a change from R-2 apartment to R-2 boarding house.

When "change of occupancy" is italicized in this chapter, it is a global term meant to describe the act of changing the classification, group or use of a building or portion thereof. The terms "change in occupancy group," "change in occupancy classification" or "change in use" where the phrase "change in occupancy" is not italicized have the meanings described above.

Note: *Changes of occupancy* that are substantial alterations as determined by Section 307.1.1 are required to comply with Section 307.

[S] 1001.2 ((~~Certificate~~)) Change of occupancy. A *change of occupancy* or a *change of occupancy* within a space where there is a different fire protection system threshold requirement in Chapter 9 of the *International Building Code* shall not be made to any structure without the approval of the *code official*. ((~~A certificate of occupancy shall be issued where it has been determined that the requirements for the *change of occupancy* have been met.~~))

[S] 1001.2.1 Change of use. Any work undertaken in connection with a change in use that does not involve a change of occupancy classification or a change to another group within an occupancy classification shall conform to the applicable requirements for the work as classified in Chapter 6 and to the requirements of Sections 1002 through 1010.

Exception: As modified in Section ((~~1204~~)) 310 for ((~~*historic buildings*~~)) *landmarks*.

[S] 1001.2.2 Change of occupancy classification or group. Where the occupancy classification or group of a building changes, the provisions of Sections 1002 through 1011 shall apply. This includes a change of occupancy classification and a change to another group within an occupancy classification.

1001.2.2.1 Partial change of occupancy. Where the occupancy classification or group of a portion of an *existing building* is changed, Section 1011 shall apply.

[S] 1001.3 Certificate of occupancy required. A certificate of occupancy shall be issued where a *change of occupancy* occurs that results in a different occupancy classification or group as determined by the *International Building Code*.

SECTION 1002
SPECIAL USE AND OCCUPANCY

[S] 1002.1 Compliance with the building code. Where the ((~~character or~~)) use of an *existing building* or part of an *existing building* is changed to one of the following special use or occupancy categories as defined in the *International Building Code*, the building shall comply with all of the applicable requirements of the *International Building Code*:

1. Covered and open mall buildings.
2. Atriums.
3. Motor vehicle-related occupancies.
4. Aircraft-related occupancies.
5. Motion picture projection rooms.
6. Stages and platforms.
7. Special amusement buildings.
8. Incidental use areas.
9. Hazardous materials.
10. Ambulatory care facilities.
11. Group I-2 occupancies.

[W] 12. Group I-1, Condition 2, for licensure as an assisted living facility under chapter 388-78A WAC or residential treatment facility under chapter 246-337 WAC.

1002.2 Underground buildings. An underground building in which there is a change of use shall comply with the requirements of the *International Building Code* applicable to underground structures.

SECTION 1003
BUILDING ELEMENTS AND MATERIALS

1003.1 General. Building elements and materials in portions of buildings undergoing a change of occupancy classification shall comply with Section 1011.

SECTION 1004
FIRE PROTECTION

1004.1 General. Fire protection requirements of Section 1011 shall apply where a building or portions thereof undergo a change of occupancy classification or where there is a *change of occupancy* within a space where there is a different fire protection system threshold requirement in Chapter 9 of the *International Building Code*.

SECTION 1005
MEANS OF EGRESS

1005.1 General. Means of egress in portions of buildings undergoing a change of occupancy classification shall comply with Section 1011.

SECTION 1006
STRUCTURAL

[S] 1006.1 Structural. Buildings or portions thereof subject to a *change of occupancy* shall comply with Section 303.2.

[S] ((~~[BS] 1006.1 Live loads.~~ ~~Structural elements carrying tributrary live loads from an area with a *change of occupancy* shall satisfy the requirements of Section 1607 of the *International Building Code*. Design live loads for areas of new occupancy shall be based on Section 1607 of the *International Building Code*. Design live loads for other areas shall be permitted to use previously *approved* design live loads.~~

~~**Exception:** Structural elements whose demand-capacity ratio considering the *change of occupancy* is not more than 5 percent greater than the demand-capacity ratio based on previously *approved* live loads.~~))

[S] ((~~[BS] 1006.2 Snow and wind loads.~~ ~~Where a *change of occupancy* results in a structure being assigned to a higher *risk category*, the structure shall satisfy the requirements of Sections 1608 and 1609 of the *International Building Code* for the new risk category~~

~~**Exception:** Where the area of the new occupancy is less than 10 percent of the building area. The cumulative effect of occupancy changes over time shall be considered.~~))

[S] ((~~[BS] 1006.4 Access to Risk Category IV.~~ ~~Any structure that provides operational access to an adjacent structure assigned to *Risk Category* IV as the result of a change of occupancy shall itself satisfy the requirements of Sections 1608, 1609 and 1613 of the *International Building Code*. For compliance with Section 1613, the full seismic forces shall be used. Where operational access to *Risk Category* IV is less than 10 feet (3048 mm) from either an interior lot line or from another structure, access protection from potential falling debris shall be provided.~~)) *

[S] ((~~SECTION 1007 ELECTRICAL~~

~~**1007.1 Special occupancies.** Where the occupancy of an *existing building* or part of an *existing building* is changed to one of the following special occupancies as described in NFPA 70, the electrical wiring and equipment of the building or portion thereof that contains the proposed occupancy shall comply with the applicable requirements of NFPA 70 whether or not a *change of occupancy* group is involved:~~

1. ~~Hazardous locations.~~
2. ~~Commercial garages, *repair* and storage.~~
3. ~~Aircraft hangars.~~
4. ~~Gasoline dispensing and service stations.~~
5. ~~Bulk storage plants.~~
6. ~~Spray application, dipping and coating processes.~~
7. ~~Health care facilities.~~
8. ~~Places of assembly.~~
9. ~~Theaters, audience areas of motion picture and television studios, and similar locations.~~
10. ~~Motion picture and television studios and similar locations.~~
11. ~~Motion picture projectors.~~
12. ~~Agricultural buildings.~~

~~**1007.2 Unsafe conditions.** Where the occupancy of an *existing building* or part of an *existing building* is changed, all unsafe conditions shall be corrected without requiring that all parts of the electrical system comply with NFPA 70.~~

~~**1007.3 Service upgrade.** Where the occupancy of an *existing building* or part of an *existing building* is changed, electrical service shall be upgraded to meet the requirements of NFPA 70 for the new occupancy.~~

~~**1007.4 Number of electrical outlets.** Where the occupancy of an *existing building* or part of an *existing building* is changed, the number of electrical outlets shall comply with NFPA 70 for the new occupancy.~~))

SECTION 1008
MECHANICAL

[S] 1008.1 Mechanical requirements. Mechanical equipment and systems shall comply with the *International Mechanical Code*. ((~~Where the occupancy of an *existing building* or part of an *existing building* is changed such that the new occupancy is subject to different kitchen exhaust requirements or to increased mechanical ventilation requirements in accordance with the *International Mechanical Code*, the new occupancy shall comply with the respective *International Mechanical Code* provisions.~~))

SECTION 1009
PLUMBING

[S] 1009.1 Increased demand. Where ((~~the~~)) a change of occupancy ((~~of~~)) in an *existing building* or part of an *existing building* ((~~is changed such that the~~)) results in a new occupancy that is subject to increased or different plumbing fixture requirements or to increased water supply requirements in accordance with the *International Building Code and* ((~~*International*~~)) *Uniform Plumbing Code*, the new occupancy shall comply with the ((~~intent of the~~)) respective *International Building Code and* ((~~*International*~~)) *Uniform Plumbing Code* provisions.

[S] 1009.2 Food-handling occupancies. If the new occupancy is a food-handling establishment, all existing sanitary waste lines above the food or drink preparation or storage areas shall be panned or otherwise protected to prevent leaking pipes or condensation on pipes from contaminating food or drink. New drainage lines shall not be installed above such areas and shall be protected in accordance with the ((~~*International*~~)) *Uniform Plumbing Code*.

[S] 1009.3 Interceptor required. If the new occupancy will produce grease or oil-laden wastes, interceptors shall be provided as required in the ((~~*International*~~)) *Uniform Plumbing Code*.

1009.4 Chemical wastes. If the new occupancy will produce chemical wastes, the following shall apply:

1. If the existing piping is not compatible with the chemical waste, the waste shall be neutralized prior to entering the drainage system, or the piping shall be changed to a compatible material.
2. Chemical waste shall not discharge to a public sewer system without the approval of the sewage authority.

[S] 1009.5 Group I-2. If the occupancy group is changed to Group I-2, the plumbing system shall comply with the applicable requirements of the ((~~*International*~~)) *Uniform Plumbing Code*.

SECTION 1010
OTHER REQUIREMENTS

[S] 1010.1 Light and ventilation. Light and ventilation shall comply with the requirements of the *International Building Code* and *International Mechanical Code* for the new occupancy.

SECTION 1011
CHANGE OF OCCUPANCY ((~~CLASSIFICATION~~))

1011.1 General. The provisions of this section shall apply to buildings or portions thereof undergoing a change of occupancy classification. This includes a change of occupancy classification within a group as well as a change of occupancy classification from one group to a different group or where there is a *change of occupancy* within a space where there is a different fire protection system threshold requirement in Chapter 9 of the *International Building Code.* Such buildings shall also comply with Sections 1002 through 1010 of this code. The application of requirements for the *change of occupancy* shall be as set forth in Sections 1011.1.1 through 1011.1.3. A *change of occupancy,* as defined in Section 202, without a corresponding change of occupancy classification shall comply with Section 1001.2.

[S] 1011.1.1 Compliance with Chapter 9. The requirements of Chapter 9 shall be applicable throughout the building for the new occupancy classification based on the separation conditions set forth in Sections 1011.1.1.1 and 1011.1.1.2. All existing buildings with a change of occupancy classification shall comply with the seismic provisions of Section 303.2.

1011.1.1.1 Change of occupancy classification without separation. Where a portion of an *existing building* is changed to a new occupancy classification or where there is a *change of occupancy* within a space where there is a different fire protection system threshold requirement in Chapter 9 of the *International Building Code,* and that portion is not separated from the remainder of the building with fire barriers having a fire-resistance rating as required in the *International Building Code* for the separate occupancy, the entire building shall comply with all of the requirements of Chapter 9 of this code applied throughout the building for the most restrictive occupancy classification in the building and with the requirements of this chapter.

1011.1.1.2 Change of occupancy classification with separation. Where a portion of an *existing building* is changed to a new occupancy classification or where there is a *change of occupancy* within a space where there is a different fire protection system threshold requirement in Chapter 9 of the *International Building Code,* and that portion is separated from the remainder of the building with fire barriers having a fire-resistance rating as required in the *International Building Code* for the separate occupancy, that portion shall comply with all of the requirements of Chapter 9 of this code for the new occupancy classification and with the requirements of this chapter.

1011.1.2 Fire protection and interior finish. The provisions of Sections 1011.2 and 1011.3 for fire protection and interior finish, respectively, shall apply to all buildings undergoing a change of occupancy classification.

1011.1.3 Change of occupancy classification based on hazard category. The relative degree of hazard between different occupancy classifications shall be determined in accordance with the categories specified in Tables 1011.4, 1011.5 and 1011.6. Such a determination shall be the basis for the application of Sections 1011.4 through 1011.7.

1011.2 Fire protection systems. Fire protection systems shall be provided in accordance with Sections 1011.2.1 and 1011.2.2.

[S] 1011.2.1 Fire sprinkler system. Where a change in occupancy classification occurs or where there is a *change of occupancy* within a space where there is a different fire protection system threshold requirement in Chapter 9 of the *International Building Code* that requires an automatic fire sprinkler system to be provided based on the new occupancy in accordance with Chapter 9 of the *International Building Code*, such system shall be provided throughout the area where the *change of occupancy* occurs.

Exception: Subject to the approval of the code official, an automatic fire sprinkler system is not required in dwelling units according to Items 1 through 6 below. This exception is permitted to be used for the *change of occupancy* for one dwelling unit after October 29, 1990.

1. The occupancy of one unit is permitted to be changed to a dwelling unit without an automatic sprinkler system unless sprinklers are otherwise required by this chapter. If more than one unit is changed, the new units shall be equipped with a sprinkler system.

2. In buildings that do not comply with the provisions of this code for number of stories, allowable area, height or type of construction before the occupancy of the unit is changed, an automatic sprinkler system shall be provided in the new unit. The change of occupancy shall not be allowed if it increases the nonconformity.
3. In buildings undergoing *substantial alteration*, an automatic sprinkler system shall be installed where required by this code for new construction.
4. The occupancy of one unit is permitted to be changed to a dwelling unit in an existing duplex without an automatic sprinkler system where both of the following conditions are met:
   4.1. The project is considered a *substantial alteration* only because of the change in occupancy; and
   4.2. The building complies with the requirements for building height and number of stories for a Group R-2 occupancy.
5. Where the occupancy of one unit is changed to a dwelling unit in an existing duplex, sprinklers are required in the new unit and not in the existing units where all of the following conditions are met:
   5.1. The existing duplex does not comply with the requirements for building height and story count for a Group R-2 occupancy;
   5.2. The project is considered a *substantial alteration* only because of the change in occupancy;
   5.3. The new unit is constructed as an addition to the duplex;
   5.4. The new unit is separated from the existing duplex by a fire wall; and
   5.5. The addition by itself complies with the requirements for a Group R-2 occupancy.
6. A sprinkler system is not required when a Group U occupancy that is accessory to a Group R-3 occupancy is converted to a dwelling unit.

1011.2.2 Fire alarm and detection system. Where a change in occupancy classification occurs or where there is a *change of occupancy* within a space where there is a different fire protection system threshold requirement in Chapter 9 of the *International Building Code* that requires a fire alarm and detection system to be provided based on the new occupancy in accordance with Chapter 9 of the *International Building Code*, such system shall be provided throughout the area where the *change of occupancy* occurs. Existing alarm notification appliances shall be automatically activated throughout the building. Where the building is not equipped with a fire alarm system, alarm notification appliances shall be provided throughout the area where the *change of occupancy* occurs in accordance with Section 907 of the *International Building Code* as required for new construction.

1011.3 Interior finish. In areas of the building undergoing the change of occupancy classification, the interior finish of walls and ceilings shall comply with the requirements of the *International Building Code* for the new occupancy classification.

1011.4 Means of egress, general. Hazard categories in regard to life safety and means of egress shall be in accordance with Table 1011.4.

TABLE 1011.4
MEANS OF EGRESS HAZARD CATEGORIES

RELATIVE HAZARD	OCCUPANCY CLASSIFICATIONS
1 (Highest Hazard)	H
2	I-2; I-3; I-4
3	A; E; I-1; M; R-1; R-2; R-4, Condition 2
4	B; F-1; R-3; R-4, Condition 1; S-1
5 (Lowest Hazard)	F-2; S-2; U

1011.4.1 Means of egress for change to a higher-hazard category. Where a change of occupancy classification is made to a higher-hazard category (lower number) as shown in Table 1011.4, the means of egress shall comply with the requirements of Chapter 10 of the *International Building Code*.

Exceptions:

1. Stairways shall be enclosed in compliance with the applicable provisions of Section 903.1.
2. Existing stairways including handrails and guards complying with the requirements of Chapter 9 shall be permitted for continued use subject to approval of the *code official*.
3. Any stairway replacing an existing stairway within a space where the pitch or slope cannot be reduced because of existing construction shall not be required to comply with the maximum riser height and minimum tread depth requirements.

4. Existing corridor walls constructed on both sides of wood lath and plaster in good condition or 1/2-inch-thick (12.7 mm) gypsum wallboard shall be permitted. Such walls shall either terminate at the underside of a ceiling of equivalent construction or extend to the underside of the floor or roof next above.
5. Existing corridor doorways, transoms and other corridor openings shall comply with the requirements in Sections 805.5.1, 805.5.2 and 805.5.3.
6. Existing dead-end corridors shall comply with the requirements in Section 805.6.
7. An existing operable window with clear opening area not less than 4 square feet (0.38 m^2) and minimum opening height and width of 22 inches (559 mm) and 20 inches (508 mm), respectively, shall be accepted as an emergency escape and rescue opening.

1011.4.2 Means of egress for change of use to an equal or lower-hazard category. Where a change of occupancy classification is made to an equal or lesser-hazard category (higher number) as shown in Table 1011.4, existing elements of the means of egress shall comply with the requirements of Section 905 for the new occupancy classification. Newly constructed or configured means of egress shall comply with the requirements of Chapter 10 of the *International Building Code*.

Exception: Any stairway replacing an existing stairway within a space where the pitch or slope cannot be reduced because of existing construction shall not be required to comply with the maximum riser height and minimum tread depth requirements.

1011.4.3 Egress capacity. Egress capacity shall meet or exceed the occupant load as specified in the *International Building Code* for the new occupancy.

1011.4.4 Handrails. Existing stairways shall comply with the handrail requirements of Section 805.9 in the area of the change of occupancy classification.

1011.4.5 Guards. Existing guards shall comply with the requirements in Section 805.11 in the area of the change of occupancy classification.

1011.5 Heights and areas. Hazard categories in regard to height and area shall be in accordance with Table 1011.5.

TABLE 1011.5
HEIGHTS AND AREAS HAZARD CATEGORIES

RELATIVE HAZARD	OCCUPANCY CLASSIFICATIONS
1 (Highest Hazard)	H
2	A-1; A-2; A-3; A-4; I; R-1; R-2; R-4, Condition 2
3	E; F-1; S-1; M
4 (Lowest Hazard)	B; F-2; S-2; A-5; R-3; R-4, Condition 1; U

[S] 1011.5.1 Height and area for change to a higher-hazard category. Where a change of occupancy classification is made to a higher-hazard category as shown in Table 1011.5, heights and areas of buildings and structures shall comply with the requirements of Chapter 5 of the *International Building Code* for the new occupancy classification.

Exception: For high-rise buildings constructed in compliance with a previously issued permit, the type of construction reduction specified in Section 403.2.1 of the *International Building Code* is permitted. ((~~This shall include the reduction for columns.~~)) The high-rise building is required to be equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Building Code.*

1011.5.1.1 Fire wall alternative. In other than Groups H, F-1 and S-1, fire barriers and horizontal assemblies constructed in accordance with Sections 707 and 711, respectively, of the *International Building Code* shall be permitted to be used in lieu of fire walls to subdivide the building into separate buildings for the purpose of complying with the area limitations required for the new occupancy where all of the following conditions are met:

1. The buildings are protected throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Fire Code*.
2. The maximum allowable area between fire barriers, horizontal assemblies, or any combination thereof shall not exceed the maximum allowable area determined in accordance with Chapter 5 of the *International Building Code* without an increase allowed for an automatic sprinkler system in accordance with Section 506 of the *International Building Code*.
3. The fire-resistance rating of the fire barriers and horizontal assemblies shall be not less than that specified for fire walls in Table 706.4 of the *International Building Code*.

   Exception: Where horizontal assemblies are used to limit the maximum allowable area, the required fire-resistance rating of the horizontal assemblies shall be permitted to be reduced by 1 hour provided that the height and

CHAPTER 11

ADDITIONS

User note:

About this chapter: *Chapter 11 provides the requirements for additions, which correlate to the code requirements for new construction. There are, however, some exceptions that are specifically stated within this chapter. An "Addition" is defined in Chapter 2 as "an extension or increase in the floor area, number of stories or height of a building or structure." Chapter 11 contains the minimum requirements for an addition that is not separated from the existing building by a fire wall.*

SECTION 1101
GENERAL

1101.1 Scope. An *addition* to a building or structure shall comply with the *International Codes* as adopted for new construction without requiring the *existing building* or structure to comply with any requirements of those codes or of these provisions, except as required by this chapter. Where an *addition* impacts the *existing building* or structure, that portion shall comply with this code.

1101.2 Creation or extension of nonconformity. An *addition* shall not create or extend any nonconformity in the *existing building* to which the *addition* is being made with regard to accessibility, structural strength, fire safety, means of egress, or the capacity of mechanical, plumbing, or electrical systems.

[S] 1101.3 Other work. Any ((~~*repair* or~~)) *alteration* work within an *existing building* to which an *addition* is being made shall comply with the applicable requirements for the work as classified in Chapter 6.

SECTION 1102
HEIGHTS AND AREAS

1102.1 Height limitations. An *addition* shall not increase the height of an *existing building* beyond that permitted under the applicable provisions of Chapter 5 of the *International Building Code* for new buildings.

1102.2 Area limitations. An *addition* shall not increase the area of an *existing building* beyond that permitted under the applicable provisions of Chapter 5 of the *International Building Code* for new buildings unless fire separation as required by the *International Building Code* is provided.

Exception: In-filling of floor openings and nonoccupiable appendages such as elevator and exit stairway shafts shall be permitted beyond that permitted by the *International Building Code*.

1102.3 Fire protection systems. Existing fire areas increased by the *addition* shall comply with Chapter 9 of the *International Building Code*.

SECTION 1103
STRUCTURAL

[S] 1103.1 Structural. *Additions* to existing buildings or structures are new construction and shall comply with Section 303.3.

[S][BS] ((~~1103.3~~)) 1103.2 Flood hazard areas. *Additions* and *foundations* in *flood hazard areas* shall comply with ((~~the following requirements:~~)) Section 310.

((~~1. For horizontal *additions* that are structurally interconnected to the *existing building*:~~

~~1.1. If the *addition* and all other proposed work, when combined, constitute *substantial improvement*, the *existing building* and the *addition* shall comply with Section 1612 of the *International Building Code*, or Section R322 of the *International Residential Code*, as applicable.~~

~~1.2. If the *addition* constitutes *substantial improvement*, the *existing building* and the *addition* shall comply with Section 1612 of the *International Building Code*, or Section R322 of the *International Residential Code*, as applicable.~~

~~2. For horizontal *additions* that are not structurally interconnected to the *existing building*:~~

~~2.1. The *addition* shall comply with Section 1612 of the *International Building Code*, or Section R322 of the *International Residential Code*, as applicable.~~

~~2.2. If the *addition* and all other proposed work, when combined, constitute *substantial improvement*, the *existing building* and the *addition* shall comply with Section 1612 of the *International Building Code*, or Section R322 of the *International Residential Code*, as applicable.~~

~~3. For vertical *additions* and all other proposed work that, when combined, constitute *substantial improvement*, the *existing building* shall comply with Section 1612 of the *International Building Code*, or Section R322 of the *International Residential Code*, as applicable.~~

~~4. For a raised or extended foundation, if the foundation work and all other proposed work, when combined, constitute *substantial improvement*, the *existing building* shall comply with Section 1612 of the *International Building Code*, or Section R322 of the *International Residential Code*, as applicable.~~

~~5. For a new foundation or replacement foundation, the foundation shall comply with Section 1612 of the *International Building Code* or Section R322 of the *International Residential Code*, as applicable.~~))

SECTION 1104
SMOKE ALARMS IN OCCUPANCY GROUPS R AND I-1

[S] 1104.1 Smoke alarms in existing portions of a building. Where an *addition* is made to a building or structure of a Group R or I-1 occupancy, the *existing building* shall be provided with smoke alarms as required by Section 1103.8 of the *International Fire Code*. ((~~or Section R314 of the *International Residential Code* as applicable.~~))

SECTION 1105
CARBON MONOXIDE ALARMS IN GROUPS I-1, I-2, I-4 AND R

1105.1 Carbon monoxide alarms in existing portions of a building. Where an *addition* is made to a building or structure of a Group I-1, I-2, I-4 or R occupancy, the *existing building* shall be equipped with carbon monoxide alarms in accordance with Section 1103.9 of the *International Fire Code* or Section R315 of the *International Residential Code*, as applicable.

[S] ((~~SECTION 1106~~
~~STORM SHELTERS~~

~~**1106.1 Addition to a Group E occupancy.** Where an *addition* is added to an existing Group E occupancy located in an area where the shelter design wind speed for tornados is 250 mph in accordance with Figure 304.2(1) of ICC 500 and the occupant load in the *addition* is 50 or more, the *addition* shall have a storm shelter constructed in accordance with ICC 500.~~

~~**Exceptions:**~~

~~1. Group E day care facilities.~~

~~2. Group E occupancies accessory to places of religious worship.~~

~~3. *Additions* meeting the requirements for shelter design in ICC 500.~~

~~**1106.1.1 Required occupant capacity.** The required occupant capacity of the storm shelter shall include all buildings on the site, and shall be the greater of the following:~~

~~1. The total occupant load of the classrooms, vocational rooms and offices in the Group E occupancy.~~

~~2. The occupant load of any indoor assembly space that is associated with the Group E occupancy.~~

~~**Exceptions:**~~

~~1. Where an *addition* is being added on an existing Group E site, and where the *addition* is not of sufficient size to accommodate the required occupant capacity of the storm shelter for all of the buildings on site, the storm shelter shall at a minimum accommodate the required capacity for the *addition*.~~

~~2. Where *approved* by the code official, the required occupant capacity of the shelter shall be permitted to be reduced by the occupant capacity of any existing storm shelters on the site.~~

~~**1106.1.2 Location.** Storm shelters shall be located within the buildings they serve, or shall be located where the maximum distance of travel from not fewer than one exterior door of each building to a door of the shelter serving that building does not exceed 1,000 feet (305 m).~~))

[S] ((~~SECTION 1107~~
~~ENERGY CONSERVATION~~

~~**1107.1 Minimum requirements.** *Additions* to *existing buildings* shall conform to the energy requirements of the *International Energy Conservation Code* or *International Residential Code* as they relate to new construction.~~))

[S] SECTION 1107
ADDITION OF DWELLING UNITS

[S] 1107.1 Automatic sprinkler systems. Automatic sprinkler systems are required when new dwelling units are added to buildings according to Items 1 through 5 below. This provision is permitted to be used to add one unit after October 29, 1990.

1. One unit is permitted to be added to a residential or commercial building without an automatic sprinkler system unless sprinklers are otherwise required by this section. If more than one unit is added, the new units shall be equipped with a sprinkler system.
2. In buildings that do not comply with the provisions of this code for number of stories, allowable area, height or type of construction before the unit is added, an automatic sprinkler system shall be provided in the new unit. The addition of the new unit shall not be allowed if it increases the nonconformity.
3. In buildings undergoing *substantial alteration*, an automatic sprinkler system shall be installed where required by this code for new construction.
4. One unit is permitted to be added to an existing duplex without an automatic sprinkler system where both of the following conditions are met:
   - 4.1 The project is considered a *substantial alteration* only because of the change in occupancy; and
   - 4.2 The building complies with the requirements for building height and number of stories for a Group R-2 occupancy.
5. Where one unit is added to an existing duplex, sprinklers are required in the new unit and not in the existing units where all of the following conditions are met:
   - 5.1 The existing duplex does not comply with the requirements for building height and story count for a Group R-2 occupancy;
   - 5.2 The project is considered a *substantial alteration* only because of the change in occupancy;
   - 5.3 The new unit is constructed as an *addition* to the duplex;
   - 5.4 The new unit is separated from the existing duplex by a fire wall; and
   - 5.5 The *addition* by itself complies with the requirements for a Group R-2 occupancy.

[S] 1107.1.1 Fire walls. An existing nonconforming building to which an *addition* is made is permitted to exceed the height, number of stories and area specified for new buildings if a fire wall is provided, the existing building is not made more nonconforming, and the *addition* conforms to this code.

CHAPTER 12

HISTORIC BUILDINGS

Note: Chapter 12 is not adopted in The City of Seattle. See Section 306 for provisions for landmark buildings.

CHAPTER 13

PERFORMANCE COMPLIANCE METHODS

User note:

About this chapter: *Chapter 13 allows for existing buildings to be evaluated so as to show that alterations, while not meeting new construction requirements, will improve the current existing situation. Provisions are based on a numerical scoring system involving 19 various safety parameters and the degree of code compliance for each issue.*

SECTION 1301
GENERAL

[S] 1301.1 Scope. The provisions of this chapter shall apply to the *alteration, addition* and *change of occupancy* of *existing structures*, ((~~including historic structures,~~)) as referenced in Section 301.3.3. The provisions of this chapter are intended to maintain or increase the current degree of public safety, health and general welfare in *existing buildings* and structures while permitting ((~~,~~)) *alteration, addition* and *change of occupancy* without requiring full compliance with Chapters 6 through ((~~12~~)) 11, except where compliance with other provisions of this code is specifically required in this chapter. *Alterations, additions* and *changes of occupancy* shall also comply with Chapter 3.

1301.1.1 Compliance with other methods. *Alterations, additions* and *changes of occupancy* to *existing structures* shall comply with the provisions of this chapter or with one of the methods provided in Section 301.3.

1301.2 Applicability. *Existing buildings* in which there is work involving *additions, alterations* or *changes of occupancy* shall be made to conform to the requirements of this chapter or the provisions of Chapters 6 through 12. The provisions of Sections 1301.2.1 through 1301.2.5 shall apply to existing occupancies that will continue to be, or are proposed to be, in Groups A, B, E, F, I-2, M, R and S. These provisions shall not apply to buildings with occupancies in Group H or I-1, I-3 or I-4.

1301.2.1 Change in occupancy. Where an *existing building* is changed to a new occupancy classification and this section is applicable, the provisions of this section for the new occupancy shall be used to determine compliance with this code.

[S] 1301.2.2 Partial change in occupancy. Where a portion of the building is changed to a new occupancy classification and that portion is separated from the remainder of the building with fire barrier or horizontal assemblies having a fire-resistance rating as required by Table 508.4 of the *International Building Code* ((~~or Section R302 of the *International Residential Code*~~)) for the separate occupancies, or with *approved* compliance alternatives, the portion changed shall be made to conform to the provisions of this section.

Where a portion of the building is changed to a new occupancy classification and that portion is not separated from the remainder of the building with fire barriers or horizontal assemblies having a fire-resistance rating as required by Table 508.4 of the *International Building Code* ((~~or Section R302 of the *International Residential Code*~~)) for the separate occupancies, or with *approved* compliance alternatives, the provisions of this section which apply to each occupancy shall apply to the entire building. Where there are conflicting provisions, those requirements which secure the greater public safety shall apply to the entire building or structure.

[S] 1301.2.3 Additions. *Additions* to *existing buildings* shall comply with the requirements of the *International Building Code* ((~~or the *International Residential Code*~~)) for new construction. The combined height and area of the *existing building* and the new *addition* shall not exceed the height and area allowed by Chapter 5 of the *International Building Code*. Where a fire wall that complies with Section 706 of the *International Building Code* is provided between the *addition* and the *existing building*, the *addition* shall be considered a separate building.

[S] ((~~1301.2.3.1 Additions to Group E facilities.~~ ~~For additions to Group E occupancies, storm shelters shall be provided in accordance with Section 1106.1.~~))

1301.2.4 Alterations. An *existing building* or portion thereof shall not be altered in such a manner that results in the building being less safe or sanitary than such building is currently.

Exception: Where the current level of safety or sanitation is proposed to be reduced, the portion altered shall conform to the requirements of the *International Building Code.*

1301.2.5 Escalators. Where escalators are provided in below-grade transportation stations, existing and new escalators shall be permitted to have a clear width of less than 32 inches (815 mm).

[S] 1301.3 Acceptance. For ((~~*repairs,*~~)) *alterations, additions*, and *changes of occupancy* to *existing buildings* that are evaluated in accordance with this section, compliance with this section shall be accepted by the *code official*.

[S] 1301.3.1 Hazards. Where the *code official* determines that an *unsafe* condition exists as provided for in Section ((~~115~~)) 101.14, such *unsafe* condition shall be abated in accordance with Section ((~~115~~)) 101.14.

[S] 1301.3.2 Compliance with other codes. Buildings that are evaluated in accordance with this section shall comply with ((~~the *International Fire Code* and *International Property Maintenance Code*~~)) Chapter 3.

* **1301.4 Investigation and evaluation.** For proposed work covered by this chapter, the building owner shall cause the *existing building* to be investigated and evaluated in accordance with the provisions of Sections 1301.4 through 1301.9.

[S][BS] 1301.4.1 Structural. ((~~analysis.~~ ~~The owner shall have a structural analysis of the *existing building* made to determine adequacy of structural systems for the proposed *alteration, addition* or *change of occupancy*. The analysis shall demonstrate that the building with the work completed is capable of resisting the loads specified in Chapter 16 of the *International Building Code*.~~)) *Alterations*, *additions* and *changes of occupancy* to *existing structures* shall comply with Section 303.

1301.4.2 Submittal. The results of the investigation and evaluation as required in Section 1301.4, along with proposed compliance alternatives, shall be submitted to the *code official.*

1301.4.3 Determination of compliance. The *code official* shall determine whether the *existing building*, with the proposed *addition*, *alteration*, or *change of occupancy*, complies with the provisions of this section in accordance with the evaluation process in Sections 1301.5 through 1301.9.

1301.5 Evaluation. The evaluation shall be composed of three categories: fire safety, means of egress, and general safety, as defined in Sections 1301.5.1 through 1301.5.3.

1301.5.1 Fire safety. Included within the fire safety category are the structural fire resistance, automatic fire detection, fire alarm, automatic sprinkler system and fire suppression system features of the *facility.*

1301.5.2 Means of egress. Included within the means of egress category are the configuration, characteristics, and support features for means of egress in the *facility.*

1301.5.3 General safety. Included within the general safety category are the fire safety parameters and the means of egress parameters.

1301.6 Evaluation process. The evaluation process specified herein shall be followed in its entirety to evaluate *existing buildings* in Groups A, B, E, F, M, R, S and U. For *existing buildings* in Group I-2, the evaluation process specified herein shall be followed and applied to each and every individual smoke compartment. Table 1301.7 shall be utilized for tabulating the results of the evaluation. References to other sections of this code or other codes indicate that compliance with those sections is required in order to gain credit in the evaluation herein outlined. In applying this section to a building with mixed occupancies, where the separation between the mixed occupancies does not qualify for any category indicated in Section 1301.6.16, the score for each occupancy shall be determined, and the lower score determined for each section of the evaluation process shall apply to the entire building, or to each smoke compartment for Group I-2 occupancies.

Where the separation between the mixed occupancies qualifies for any category indicated in Section 1301.6.16, the score for each occupancy shall apply to each portion, or smoke compartment of the building based on the occupancy of the space.

1301.6.1 Building height and number of stories. The value for building height and number of stories shall be the lesser value determined by the formula in Section 1301.6.1.1. Section 504 of the *International Building Code* shall be used to determine the allowable height and number of stories of the building. Subtract the actual building height from the allowable height and divide by 12-1/2 feet (3810 mm). Enter the height value and its sign (positive or negative) in Table 1301.7 under Safety Parameter 1301.6.1, Building Height, for fire safety, means of egress, and general safety. The maximum score for a building shall be 10.

1301.6.1.1 Height formula. The following formulas shall be used in computing the building height value.

$$\text{Height value, feet} = \frac{(AH) - (EBH)}{12.5} \times CF \qquad \textbf{(Equation 13-1)}$$

$$\text{Height value, stories} = (AS - EBS) \times CF \qquad \textbf{(Equation 13-2)}$$

where:

AH = Allowable height in feet (mm) from Section 504 of the *International Building Code*.

EBH = *Existing building* height in feet (mm).

AS = Allowable height in stories from Section 504 of the *International Building Code*.

EBS = *Existing building* height in stories.

CF = 1 if *(AH) – (EBH)* is positive.

CF = Construction-type factor shown in Table 1301.6.6(2) if *(AH) – (EBH)* is negative.

Note: Where mixed occupancies are separated and individually evaluated as indicated in Section 1301.6, the values *AH, AS, EBH* and *EBS* shall be based on the height of the occupancy being evaluated.

covered and open mall buildings, high-rise buildings, public garages and unlimited area buildings. Assign the lowest score from Table 1301.6.19 for the building or floor area being evaluated and enter that value into Table 1301.7 under Safety Parameter 1301.6.19, Incidental Uses, for fire safety, means of egress and general safety. If there are no specific occupancy areas in the building or floor area being evaluated, the value shall be zero.

TABLE 1301.6.19
INCIDENTAL USE AREA VALUES

PROTECTION REQUIRED BY TABLE 509 OF THE *INTERNATIONAL BUILDING CODE*	PROTECTION PROVIDED						
	None	1 hour	AS	AS with CRS	1 hour and AS	2 hours	2 hours and AS
2 hours and AS	-4	-3	-2	-2	-1	-2	0
2 hours, or 1 hour and AS	-3	-2	-1	-1	0	0	0
1 hour and AS	-3	-2	-1	-1	0	-1	0
1 hour	-1	0	-1	-1	0	0	0
1 hour, or AS with CRS	-1	0	-1	-1	0	0	0
AS with CRS	-1	-1	-1	-1	0	-1	0
1 hour or AS	-1	0	0	0	0	0	0

AS = Automatic Sprinkler System;
CRS = Construction capable of resisting the passage of smoke (see IBC Section 509.4.2 of the *International Building Code*).
((~~**Note:** For Table 1301.7, see page 71.~~))

1301.6.20 Smoke compartmentation. Evaluate the smoke compartments for compliance with Section 407.5 of the *International Building Code*. Under the categories and occupancies in Table 1301.6.20, determine the appropriate smoke compartmentation value (SCV) and enter that value into Table 1301.7 under Safety Parameter 1301.6.20, Smoke Compartmentation, for fire safety, means of egress and general safety. Facilities in Group I-2 occupancies meeting Category b or c shall be considered to fail the evaluation.

TABLE 1301.6.20
SMOKE COMPARTMENTATION VALUES

OCCUPANCY	CATEGORIES[a]		
	a	b	c
A, B, E, F, M, R and S	0	0	0
I-2	0	NP	NP

For SI: 1 square foot = 0.093 m^2.
NP = Not Permitted.
a. For areas between categories, the smoke compartmentation value shall be obtained by linear interpolation.

1301.6.20.1 Categories. Categories for smoke compartment size are:

1. Category a—Smoke compartment size is equal to or less than 22,500 square feet (2092 m^2).
2. Category b—Smoke compartment size is greater than 22,500 square feet (2092 m^2).
3. Category c—Smoke compartments are not provided.

1301.6.21 Patient ability, concentration, smoke compartment location and ratio to attendant. In I-2 occupancies, the ability of patients, their concentration and ratio to attendants shall be evaluated and applied in accordance with this section. Evaluate each smoke compartment using the categories in Sections 1301.6.21.1, 1301.6.21.2 and 1301.6.21.3 and enter the value in Table 1301.7. To determine the safety factor, multiply the three values together; if the sum is 9 or greater, compliance has failed.

CHAPTER 14

RELOCATED OR MOVED BUILDINGS

Note: Chapter 14 is not adopted in The City of Seattle. See Section 309 for provisions applying to moved structures.

CHAPTER 15

CONSTRUCTION SAFEGUARDS

User note:

About this chapter: *The building construction process involves a number of known and unanticipated hazards. Chapter 15 establishes specific regulations in order to minimize the risk to the public and adjacent property. Some construction failures have resulted during the initial stages of grading, excavation and demolition. During these early stages, poorly designed and installed sheeting and shoring have resulted in ditch and embankment cave-ins. Also, inadequate underpinning of adjoining existing structures or careless removal of existing structures has produced construction failures.*

SECTION 1501
GENERAL

[BG] 1501.1 Scope. The provisions of this chapter shall govern safety during construction and the protection of adjacent public and private properties.

[BG] 1501.2 Storage and placement. Construction equipment and materials shall be stored and placed so as not to endanger the public, the workers or adjoining property for the duration of the construction project.

[BG] 1501.3 Alterations, repairs and additions. Required exits, existing structural elements, fire protection devices and sanitary safeguards shall be maintained at all times during *alterations*, *repairs* or *additions* to any building or structure.

Exceptions:

1. Where such required elements or devices are being altered or repaired, adequate substitute provisions shall be made.
2. Maintenance of such elements and devices is not required where the *existing building* is not occupied.

[BG] 1501.4 Manner of removal. Waste materials shall be removed in a manner that prevents injury or damage to persons, adjoining properties and public rights-of-way.

[BG] 1501.5 Fire safety during construction. Fire safety during construction shall comply with the applicable requirements of the *International Building Code* and the applicable provisions of Chapter 33 of the *International Fire Code.*

[S][BS] 1501.6 Protection of pedestrians. ((~~Pedestrians shall be protected during construction and demolition activities as required by Sections 1501.6.1 through 1501.6.7 and Table 1501.6. Signs shall be provided to direct pedestrian traffic.~~)) The protection of the public and of the sidewalks, streets and other public property during construction or demolition shall be provided as required by the Street Use Ordinance, Seattle Municipal Code Title 15.

[S] ((~~[BS] TABLE 1501.6~~
~~PROTECTION OF PEDESTRIANS~~

~~HEIGHT OF CONSTRUCTION~~	~~DISTANCE OF CONSTRUCTION TO LOT LINE~~	~~TYPE OF PROTECTION REQUIRED~~
~~8 feet or less~~	~~Less than 5 feet~~	~~Construction railings~~
	~~5 feet or more~~	~~None~~
~~More than 8 feet~~	~~Less than 5 feet~~	~~Barrier and covered walkway~~
	~~5 feet or more, but not more than one-fourth the height of construction~~	~~Barrier and covered walkway~~
	~~5 feet or more, but between one-fourth and one-half the height of construction~~	~~Barrier~~
	~~5 feet or more, but exceeding one-half the height of construction~~	~~None~~

~~For SI: 1 foot = 304.8 mm.~~))

[S] ((~~[BS] 1501.6.1 Walkways.~~ ~~A walkway shall be provided for pedestrian travel in front of every construction and demolition site unless the applicable governing authority authorizes the sidewalk to be fenced or closed. A walkway shall be provided for pedestrian travel that leads from a building entrance or exit of an occupied structure to a public way. Walkways shall be of sufficient width to accommodate the pedestrian traffic, but shall be not less than 4 feet (1219 mm) in width. Walkways shall be provided with a durable walking surface and shall be accessible in accordance with Chapter 11 of the *International Building Code*. Walkways shall be designed to support all imposed loads and the design live load shall be not less than 150 pounds per square foot (psf) (7.2 kN/m^2).~~))

[S] ((~~[BS] 1501.6.2 Directional barricades.~~ ~~Pedestrian traffic shall be protected by a directional barricade where the walkway extends into the street. The directional barricade shall be of sufficient size and construction to direct vehicular traffic away from the pedestrian path.~~))

[S] ((~~[BS] 1501.6.3 Construction railings.~~ ~~Construction railings shall be not less than 42 inches (1067 mm) in height and shall be sufficient to direct pedestrians around construction areas.~~))

[S] ((~~[BS] 1501.6.4 Barriers.~~ ~~Barriers shall be not less than 8 feet (2438 mm) in height and shall be placed on the side of the walkway nearest the construction. Barriers shall extend the entire length of the construction site. Openings in such barriers shall be protected by doors that are normally kept closed.~~

~~**[BS] 1501.6.4.1 Barrier design.** Barriers shall be designed to resist loads required in Chapter 16 of the *International Building Code* unless constructed as follows:~~

1. ~~Barriers shall be provided with 2-inch by 4-inch (51 mm by 102 mm) top and bottom plates.~~
2. ~~The barrier material shall be boards not less than 3/4 inch (19.1 mm) in thickness or wood structural use panels not less than 1/4 inch (6.4 mm) in thickness.~~
3. ~~Wood structural use panels shall be bonded with an adhesive identical to that for exterior wood structural use panels.~~
4. ~~Wood structural use panels 1/4 inch (6.4 mm) or 15/16 inch (23.8 mm) in thickness shall have studs spaced not more than 2 feet (610 mm) on center.~~
5. ~~Wood structural use panels 3/8 inch (9.5 mm) or 1/2 inch (12.7 mm) in thickness shall have studs spaced not more than 4 feet (1219 mm) on center, provided that a 2-inch by 4-inch (51 mm by 102 mm) stiffener is placed horizontally at mid-height where the stud spacing is greater than 2 feet (610 mm) on center.~~
6. ~~Wood structural use panels 5/8 inch (15.9 mm) or thicker shall not span over 8 feet (2438 mm).~~))

[S] ((~~[BS] 1501.6.5 Covered walkways.~~ ~~Covered walkways shall have a clear height of not less than 8 feet (2438 mm) as measured from the floor surface to the canopy overhead. Adequate lighting shall be provided at all times. Covered walkways shall be designed to support all imposed loads. The design live load shall be not less than 150 psf (7.2 kN/m2) for the entire structure.~~

~~**Exception:** Roofs and supporting structures of covered walkways for new, light-frame construction not exceeding two stories above grade plane are permitted to be designed for a live load of 75 psf (3.6 kN/m2) or the loads imposed on them, whichever is greater. In lieu of such designs, the roof and supporting structure of a covered walkway are permitted to be constructed as follows:~~

1. ~~Footings shall be continuous 2-inch by 6-inch (51 mm by 152 mm) members.~~
2. ~~Posts not less than 4 inches by 6 inches (102 mm by 152 mm) shall be provided on both sides of the roof and spaced not more than 12 feet (3658 mm) on center.~~
3. ~~Stringers not less than 4 inches by 12 inches (102 mm by 305 mm) shall be placed on edge on the posts.~~
4. ~~Joists resting on the stringers shall be not less than 2 inches by 8 inches (51 mm by 203 mm) and shall be spaced not more than 2 feet (610 mm) on center.~~
5. ~~The deck shall be planks not less than 2 inches (51 mm) thick or wood structural panels with an exterior exposure durability classification not less than 23/32 inch (18.3 mm) thick nailed to the joists.~~
6. ~~Each post shall be knee-braced to joists and stringers by members not less than 2 inches by 4 inches (51 mm by 102 mm); 4 feet (1219 mm) in length.~~
7. ~~A curb that is not less than 2 inches by 4 inches (51 mm by 102 mm) shall be set on edge along the outside edge of the deck.~~))

[S] ((~~[BS] 1501.6.6 Repair, maintenance and removal.~~ ~~Pedestrian protection required by Section 1501.6 shall be maintained in place and kept in good order for the entire length of time pedestrians are subject to being endangered. The owner or the owner's authorized agent, on completion of the construction activity, shall immediately remove walkways, debris and other obstructions and leave such public property in as good a condition as it was before such work was commenced.~~))

[S] ((~~[BS] 1501.6.7 Adjacent to excavations.~~ ~~Every excavation on a site located 5 feet (1524 mm) or less from the street lot line shall be enclosed with a barrier not less than 6 feet (1829 mm) in height. Where located more than 5 feet (1524 mm) from the street lot line, a barrier shall be erected where required by the *code official*. Barriers shall be of adequate strength to resist wind pressure as specified in Chapter 16 of the *International Building Code*.~~))

[S] 1501.7 Facilities required. Sanitary facilities shall be provided during construction or demolition activities in accordance with the ((~~*International*~~)) *Uniform Plumbing Code*.

SECTION 1502
PROTECTION OF ADJOINING PROPERTY

[S][BS] 1502.1 Protection required. Adjoining public and private property shall be protected from damage during construction and demolition work. Protection must be provided for footings, foundations, party walls, chimneys, skylights and roofs. Provisions shall be made to control water runoff and erosion during construction or demolition activities. ((~~The person making or causing an excavation to be made shall provide written notice to the owners of adjoining buildings advising them that the excavation is to be made and that the adjoining buildings should be protected. Said notification shall be delivered not less than 10 days prior to the scheduled starting date of the excavation.~~)) When the existing grade of a site is altered by filling, excavating, dredging or moving of earth materials, the owner shall protect all adjoining property during construction from encroachment or collapse by sloping the sides of the temporary grading at a slope that is safe and not more than one horizontal to one vertical. In addition, adjoining property shall be protected from encroachment or collapse by sloping the sides of the permanent grading at a slope not greater than two horizontal to one vertical. The *code official* is authorized to approve temporary or permanent slopes that are steeper based on a design by an experienced geotechnical engineer.

In areas of known unsuitable soils, the *code official* is authorized to require slopes that are less steep to assure protection of adjoining property.

SECTION 1503
TEMPORARY USE OF STREETS, ALLEYS AND PUBLIC PROPERTY

[S] ((~~[BG] 1503.1 Storage and handling of materials.~~ ~~The temporary use of streets or public property for the storage or handling of materials or equipment required for construction or demolition, and the protection provided to the public shall comply with the provisions of the applicable governing authority and this chapter.~~))

[S] 1503.1 General. Temporary use of streets, alleys and public property shall comply with the Street Use Ordinance, Seattle Municipal Code Title 15.

[S] ((~~[BG] 1503.2 Obstructions.~~ ~~Construction materials and equipment shall not be placed or stored so as to obstruct access to fire hydrants, standpipes, fire or police alarm boxes, catch basins or manholes, nor shall such material or equipment be located within 20 feet (6096 mm) of a street intersection, or placed so as to obstruct normal observations of traffic signals or to hinder the use of public transit loading platforms.~~))

[S] ((~~[BG] 1503.3 Utility fixtures.~~ ~~Building materials, fences, sheds or any obstruction of any kind shall not be placed so as to obstruct free approach to any fire hydrant, fire department connection, utility pole, manhole, fire alarm box, or catch basin, or so as to interfere with the passage of water in the gutter. Protection against damage shall be provided to such utility fixtures during the progress of the work, but sight of them shall not be obstructed.~~))

SECTION 1504
FIRE EXTINGUISHERS

[F] 1504.1 Where required. Structures under construction, *alteration* or demolition shall be provided with not fewer than one *approved* portable fire extinguisher in accordance with Section 906 of the *International Fire Code* and sized for not less than ordinary hazard as follows:

1. At each stairway on all floor levels where combustible materials have accumulated.
2. In every storage and construction shed.
3. Additional portable fire extinguishers shall be provided where special hazards exist, such as the storage and use of flammable and combustible liquids.

[F] 1504.2 Fire hazards. The provisions of this code and of the *International Fire Code* shall be strictly observed to safeguard against all fire hazards attendant upon construction operations.

SECTION 1505
MEANS OF EGRESS

[BE] 1505.1 Stairways required. Where building construction exceeds 40 feet (12 192 mm) in height above the lowest level of fire department vehicle access, a temporary or permanent stairway shall be provided. As construction progresses, such stairway shall be extended to within one floor of the highest point of construction having secured decking or flooring.

[F] 1505.2 Maintenance of means of egress. Means of egress and required accessible means of egress shall be maintained at all times during construction, demolition, remodeling or *alterations* and *additions* to any building.

Exception: Existing means of egress need not be maintained where *approved* temporary means of egress and accessible means of egress systems and facilities are provided.

SECTION 1506
STANDPIPES

[F] 1506.1 Where required. In buildings required to have standpipes by Section 905.3.1 of the *International Building Code*, not less than one standpipe shall be provided for use during construction. Such standpipes shall be installed prior to construction exceeding 40 feet (12 192 mm) in height above the lowest level of fire department vehicle access. Such standpipes shall be provided with fire department hose connections at locations adjacent to *stairways*, complying with Section 1505.1. As construction progresses, such standpipes shall be extended to within one floor of the highest point of construction having secured decking or flooring.

[F] 1506.2 Buildings being demolished. Where a building or portion of a building is being demolished and a standpipe is existing within such a building, such standpipe shall be maintained in an operable condition so as to be available for use by the fire department. Such standpipe shall be demolished with the building but shall not be demolished more than one floor below the floor being demolished.

[F] 1506.3 Detailed requirements. Standpipes shall be installed in accordance with the provisions of Chapter 9 of the *International Building Code*.

Exception: Standpipes shall be either temporary or permanent in nature, and with or without a water supply, provided that such standpipes conform to the requirements of Section 905 of the *International Building Code* as to capacity, outlets and materials.

SECTION 1507
AUTOMATIC SPRINKLER SYSTEM

[S][F] 1507.1 Completion before occupancy. In buildings where an automatic sprinkler system is required by this code or the *International Building Code*, it shall be unlawful to occupy any portions of a building or structure until the automatic sprinkler system installation has been tested and *approved*, ((~~except as provided in Section 110.3~~)) unless approved by the *code official*.

[F] 1507.2 Operation of valves. Operation of sprinkler control valves shall be permitted only by properly authorized personnel and shall be accompanied by notification of duly designated parties. When the sprinkler protection is being regularly turned off and on to facilitate connection of newly completed segments, the sprinkler control valves shall be checked at the end of each work period to ascertain that protection is in service.

SECTION 1508
ACCESSIBILITY

[BE] 1508.1 Construction sites. Structures, sites, and equipment directly associated with the actual process of construction, including but not limited to scaffolding, bridging, material hoists, material storage, or construction trailers are not required to be accessible.

SECTION 1509
WATER SUPPLY FOR FIRE PROTECTION

[F] 1509.1 When required. An *approved* water supply for fire protection, either temporary or permanent, shall be made available as soon as combustible material arrives on the site.

[S] SECTION 1510
DEMOLITION

1510.1 Construction documents. Construction documents and a schedule for demolition shall be submitted where required by the *code official*. Where such information is required, no work shall be done until such construction documents or schedule, or both, are approved.

1510.2 Pedestrian protection. The work of demolishing any building shall not be commenced until pedestrian protection is in place as required by this chapter and the Street Use Ordinance, Seattle Municipal Code Title 15.

1510.3 Means of egress. A horizontal exit shall not be destroyed unless and until a substitute means of egress has been provided and approved.

1510.4 Surface condition and fill. The site shall be left level and free of debris upon completion of demolition, and all holes shall be filled or protected with secure fences. Holes are permitted to be filled with concrete, rocks or other nondecaying material no larger than 12 inches (305 mm) in diameter. Wood and other organic material shall not be buried on the site. Leaving the site level means:

1. The grade conforms to that existing on all sides;

2. Surface water will drain off;
3. Surface is smooth; and
4. Broken sections of the foundation or other material are not exposed.

The site shall be seeded upon completion of the demolition if it is to be left vacant for more than 6 months.

1510.5 Water accumulation. Provision shall be made to prevent the accumulation of water or damage to any foundations on the premises or the adjoining property.

1510.6 Utility connections. Service utility connections shall be discontinued and capped in accordance with requirements of the governing utility or agency including, but not limited to, Seattle Public Utilities, Seattle Department of Transportation, Seattle Fire Department, Seattle City Light, Puget Sound Energy and Qwest Communications.

1510.7 Fire safety during demolition. Fire safety during demolition shall comply with the applicable requirements of this code and the applicable provisions of Chapter 56 of the *International Fire Code*.

1510.8 Removal of hazardous and combustible materials. All asbestos and other hazardous material shall be removed prior to demolition, in accordance with regulations of the Environmental Protection Agency, the Puget Sound Clean Air Agency and other pertinent agencies. Combustible waste shall be removed in accordance with the Fire Code. During demolition, streets and sidewalks shall be left clean at the end of each day's operation.

1510.9 Welding and cutting. Welding and cutting shall be performed in accordance with the *International Fire Code*.

1510.10 Erosion and sediment control. Provision shall be made to stabilize ground conditions to eliminate dust and erosion. Demolition sites shall comply with the Seattle Stormwater Code, Seattle Municipal Code (SMC) Title 22, Subtitle VIII, and the Seattle Grading Code, SMC Chapter 22.170.

1510.11 Drainage. If the demolition will result in a change of drainage patterns, the flow of all watercourses, including streams, ditches, drains, combined sewers and runoff, intercepted during the progress of the work, shall be returned to the condition present before the demolition or as specified on the permit, and in accordance with the Seattle Stormwater Code and Seattle Grading Code, SMC Title 22, Subtitle VIII, and SMC Chapter 22.170, respectively.

1510.12 Foundations and footings. All concrete or masonry floors, foundations, footings, basement walls and retaining walls not to be reused shall be removed to 18 inches (457 mm) below final grade. All concrete floors left in place shall be broken so as to allow water to drain through unless the floors are to be used.

1510.13 Engineer's report. The *code official* is permitted to require a structural engineer's analysis of proposed demolition or any portions of a structure remaining after demolition.

1510.14 Underground tanks. When demolition occurs, all underground tanks on the site shall either be removed or filled, as required by the *International Fire Code*.

[S] SECTION 1511
SITE WORK

1511.1 Excavation and fill. Excavation and fill for buildings and structures shall be constructed or protected so as not to endanger life or property. Stumps and roots shall be removed from the soil to a depth of not less than 12 inches (305 mm) below the surface of the ground in the area to be occupied by the building. Wood forms which have been used in placing concrete, if within the ground or between foundation sills and the ground, shall be removed before a building is occupied or used for any purpose. Before completion, loose or casual wood shall be removed from direct contact with the ground under the building.

1511.1.1 Slope limits. Slopes for permanent fill shall be not steeper than one unit vertical in two units horizontal (50-percent slope). Cut slopes for permanent excavations shall be not steeper than one unit vertical in two units horizontal (50-percent slope). Deviation from the foregoing limitations shall be permitted only upon the presentation of a soil investigation report acceptable to the *code official*.

1511.1.2 Surcharge. No fill or other surcharge loads shall be placed adjacent to any building or structure unless such building or structure is capable of withstanding the additional loads caused by the fill or surcharge. Existing footings or foundations which can be affected by any excavation shall be underpinned adequately or otherwise protected against settlement and shall be protected against later movement.

1511.1.3 Fill supporting foundations. Fill to be used to support the foundations of any building or structure shall comply with *International Building Code* Section 1804.5. Special inspections of compacted fill shall be in accordance with *International Building Code* Section 1705.6.

[S] SECTION 1512
CONSTRUCTION MATERIAL MANAGEMENT

1512.1 Storage and handling of materials. Materials stored and handled on site during construction shall comply with the manufacturer's printed instructions. Where manufacturer's printed instructions are not available, approved standards or guidelines shall be followed.

1512.2 Construction phase moisture control. Porous or fibrous materials and other materials subject to moisture damage shall be protected from moisture during construction. Material damaged by moisture or that is visibly colonized by fungi either prior to delivery or during construction shall be cleaned and dried or, where damage cannot be corrected by such means, shall be removed and replaced.

CHAPTER 16
REFERENCED STANDARDS

User note:

About this chapter: *This code contains numerous references to standards that are used to regulate materials and methods of construction. Chapter 16 contains a comprehensive list of all standards that are referenced in the code, including the appendices. The standards are part of the code to the extent of the reference to the standard. Compliance with the referenced standard is necessary for compliance with this code. By providing specifically adopted standards, the construction and installation requirements necessary for compliance with the code can be readily determined. The basis for code compliance is, therefore, established and available on an equal basis to the building code official, contractor, designer and owner.*

This chapter lists the standards that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title, and the section or sections of this document that reference the standard. The application of the referenced standards shall be as specified in Section 102.4.

ASCE/SEI

American Society of Civil Engineers
Structural Engineering Institute
1801 Alexander Bell Drive
Reston, VA 20191-4400

7—16: Minimum Design Loads and Associated Criteria for Buildings and Other Structures
303.2, 303.1.7, 303.3.1, 503.4, 503.12, 800.3 ((~~, 806.4~~))

((~~31-03: Seismic Evaluation of Existing Buildings~~
~~303.1.4, 303.1.5, 305.4, 305.4.2, Table 305.4.2, 907.2~~))

41—17: Seismic Evaluation and Retrofit of Existing Buildings
303.3.1, Table 303.3.1, 303.3.2, Table 303.3.2

ASHRAE

ASHRAE
1791 Tullie Circle, NE
Atlanta, GA 30329

62.1—2016: Ventilation for Acceptable Indoor Air Quality
808.2

ASME

American Society of Mechanical Engineers
Two Park Avenue
New York, NY 10016

ASME A17.1—2016/CSA B44—16: Safety Code for Elevators and Escalators
305.8.2, 902.1.2

A17.3—2015: Safety Code for Existing Elevators and Escalators
902.1.2

A18.1—2014: Safety Standard for Platform Lifts and Stairway Chair Lifts
305.8.3

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959

C94/C94M—15A: Specification for Ready-mixed Concrete
109.3.1

E84—2016: Standard Test Method for Surface Burning Characteristics of Building Materials
1204.9

E108—16: Standard Test Methods for Fire Tests of Roof Coverings
1204.5

ASTM—continued

E136—16: Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C
202

F2006—17: Standard Safety Specification for Window Fall Prevention Devices for Non Emergency Escape (Egress) and Rescue (Ingress) Windows
505.2, 702.4

F2090—17: Standard Specification for Window Fall Prevention Devices with Emergency (Egress) Release Mechanisms
505.2, 505.3, 702.4, 702.5

ICC

International Code Council, Inc.
500 New Jersey Avenue, NW
6th Floor
Washington, DC 20001

IBC—18: International Building Code®
101.4.1, 104.2.1, 106.2.2, 109.3.3, 109.3.6, 109.3.9, 110.2, 202, 301.3, 302.5.1, 302.6, ((~~303.1~~)) 303.1.3, 303.1.3.1, 303.1.4, 303.1.7, 303.3.1, 303.3.1.1, 303.3.2, 304, 305.4, 305.4.2, 305.6, 305.8.1, 305.8.4, 305.8.5, 305.8.6, 305.8.7, 305.8.8, 305.8.10, 305.8.11, 305.8.15, 305.9, 305.9.3, 305.9.4, 308.1, 308.3, 310.1, 401.2, 402.3, 405.2.1.1, 405.2.3.1, 405.2.3.3, 405.2.4, 405.2.5, 501.2, 502.1, 502.3, ((~~502.4,~~)) 502.5, 503.1, 503.2, 503.3, 503.4, 503.5, 503.11, 503.12, 503.13, 503.16.1, 503.16.2, 503.16.3, 505.2, 505.3, 505.4, 506.1, 506.3, 506.4.1, 506.4.2, 506.4.3, 506.4.4, 507.3, 701.2, ((~~701.3,~~)) 701.4, 702.1, 702.2, 702.3, 702.4, 702.5, 702.6, ((~~705.1,~~)) 706.2, 801.3, 802.2.1, 802.2.3, 802.3, 802.4, 802.5.2, 802.6, 803.1.1, 803.2, 803.2.2, 803.2.3, 803.3, 805.3.1, 805.3.1.1, Table 805.3.1.1(1), 805.3.1.2.1, 805.4.3, 805.4.5, 805.5, 805.6, 805.7.1, 805.8.1, 805.9.2, 805.10.1.1, 805.10.1.2, 805.10.1.3, 805.10.2, 805.11.2, ((~~806.2, 806.3,~~)) ((~~806.4,~~)) 904.1.2, 904.1.3, 904.1.4, 904.2, 904.2.1, 904.2.2, 905.2, 905.3, 906.2, 906.3, 1001.2, 1001.3, 1002.1, 1002.2, 1004.1, 1006.1, 1006.2, 1006.3, 1006.4, 1010.1, 1011.1, 1011.1.1.1, 1011.1.1.2, 1011.2.1, 1011.2.2, 1011.3, 1011.4.1, 1011.4.2, 1011.4.3, 1011.5.1, 1011.5.1.1, 1011.5.3, 1011.6.1, 1011.6.3, 1011.7.1, 1011.7.2, 1011.7.3, 1102.1, 1102.2, 1102.3, ((~~1103.1,~~)) 1103.2, 1103.3, 1201.4, 1202.2, 1203.12, 1204.2, 1204.9, 1206.1, 1301.2.2, 1301.2.3, 1301.2.4, 1301.3.3, 1301.4.1, 1301.6.1, 1301.6.1.1, 1301.6.2, 1301.6.2.1, 1301.6.3.1, 1301.6.3.2, 1301.6.4.1, 1301.6.5, 1301.6.5.1, 1301.6.6, 1301.6.7.1, 1301.6.8, 1301.6.9, 1301.6.9.1, 1301.6.10, 1301.6.10.1, 1301.6.11, 1301.6.11.1, 1301.6.12.1, 1301.6.13, 1301.6.15.1, 1301.6.16.1, 1301.6.17, 1301.6.17.1, 1301.6.18, 1301.6.18.1, 1301.6.19, Table 1301.6.19, 1301.6.20, 1401.2, 1402.1, 1402.2, 1402.2.1, 1402.3, 1402.4, 1402.5, 1402.6, 1501.5, 1501.6.1, 1501.6.4.1, 1501.6.7, 1506.3

ICC A117.1—09: Accessible and Usable Buildings and Facilities
301.5, 305.8.2, 305.8.3, 305.8.10

ICC 300—17: ICC Standard on Bleachers, Folding and Telescopic Seating and Grandstands
501.1

ICC 500—14: Standard for the Design and Construction of Storm Shelters
1106.1

IECC—18: International Energy Conservation Code®
302.3, 702.6, 707.1, 810.1, 907.1, 1107.1

IFC—18: International Fire Code®
101.4.2, 301.3.1, 302.3, ((~~502.6, 502.7~~)) 502.3, 502.4, 503.14, 503.15, 802.2.1, 802.2.3, 803.4.1.1, 803.4.1.2, 803.4.1.3, 803.4.1.4, 803.4.1.5, 803.4.1.6, 803.4.1.7, 803.4.3, 804.1, 1011.5.1.1, 1104.1, 1105.1, 1301.3.2, 1301.6.8.1, 1301.6.14, 1304.6.14.1, 1401.2, 1501.5, 1504.1, 1504.2

IFGC—18: International Fuel Gas Code®
302.3, 702.6.1

IMC—18: International Mechanical Code®
302.3, 702.6, 808.1, 902.1.1, 1008.1, 1301.6.7.1, 1301.6.8, 1301.6.8.1

IPC—18: International Plumbing Code®
302.3, 408.1, 702.6, 809.1, 1009.1, 1009.2, 1009.3, 1009.5, 1501.7

IPMC—18: International Property Maintenance Code®
101.4.2, 302.3, 1301.3.2, 1401.2

ICC—continued

IRC—18: International Residential Code®

101.2, 101.4.1, 302.3, 310.1, 310.1.1, 401.3, 402.3, 405.2.5, ((~~502.3, 502.4, 502.5, 502.7~~)) 502.4, 503.2, 503.3, 503.11, 505.2, 505.3, 507.3, 701.3, 702.4, 702.5, 706.2, 707.1, ((~~806.2,~~)) 807.3, 810.1, 906.2, 907.1, ((~~1103.1, 1103.2, 1103.3, 1103.4,~~)) 1104.1, 1105.1, 1107.1, 1201.4, 1301.2.2, 1301.2.3, 1301.3.3, 1401.2, 1402.1, 1402.2, 1402.2.1, 1402.3, 1402.4, 1402.5, 1402.6

NFPA

National Fire Protection Agency
1 Batterymarch Park
Quincy, MA 02169-7471

NFPA 13R—16: Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height

803.2.4

NFPA 70—17: National Electrical Code

107.3, 302.3, 406.1.1, 406.1.2, 406.1.3, 406.1.4, 406.1.5, 807.1, 807.3.4, 807.3.7, 1007.1, 1007.2, 1007.3, 1007.4

NFPA 72—16: National Fire Alarm and Signaling Code

803.2.4, 803.4

NFPA 99—18: Health Care Facilities Code

406.1.4

NFPA 101—18: Life Safety Code

805.2

UL

UL LLC
333 Pfingsten Road
Northbrook, IL 60062

723—08: Standard for Test for Surface Burning Characteristics of Building Materials—with Revisions through August 2013

1204.9

790—04: Standard Test Methods for Fire Tests of Roof Coverings—with Revisions through July 2014

1204.5

[BS] CROSSWALL. A new or existing wall that meets the requirements of Section A111.3. A crosswall is not a shear wall.

[BS] CROSSWALL SHEAR CAPACITY. The unit shear value times the length of the crosswall, $v_c L_c$.

[BS] DETAILED BUILDING SYSTEM ELEMENTS. The localized elements and the interconnections of these elements that define the design of the building.

[BS] DIAPHRAGM EDGE. The intersection of the horizontal diaphragm and a shear wall.

[BS] DIAPHRAGM SHEAR CAPACITY. The unit shear value times the depth of the diaphragm, $v_u D$.

[BS] FLEXIBLE DIAPHRAGM. A diaphragm of wood or untopped metal deck construction in which the horizontal deformation along its length is at least two times the average story drift.

HEAD JOINT. The vertical mortar joint placed between masonry units within the wythe.

[BS] NORMAL WALL. A wall perpendicular to the direction of seismic forces.

[BS] OPEN FRONT. An exterior building wall line on one side only without vertical elements of the seismic force-resisting system in one or more stories.

[BS] POINTING. The process of removal of deteriorated mortar from between masonry units and placement of new mortar. Also known as repointing or tuckpointing for purposes of this chapter.

[BS] REPOINTING. See "Pointing."

[BS] RIGID DIAPHRAGM. A diaphragm of concrete construction or concrete-filled metal deck construction.

[BS] TUCKPOINTING. See "Pointing."

[BS] UNREINFORCED MASONRY (URM). Includes burned clay, concrete or sand-lime brick; hollow clay or concrete block; plain concrete; and hollow clay tile. These materials shall comply with the requirements of Section A106 as applicable.

[BS] UNREINFORCED MASONRY BEARING WALL. A URM wall that provides the vertical support for the reaction of floor or roof-framing members for which the total superimposed vertical load exceeds 100 pounds per linear foot (1459 N/m) of wall length.

[BS] UNREINFORCED MASONRY WALL. A masonry wall that relies on the tensile strength of masonry units, mortar and grout in resisting design loads, and in which the area of reinforcement is less than the minimum amounts as defined for reinforced masonry walls.

[BS] YIELD STORY DRIFT. The lateral displacement of one level relative to the level above or below at which yield stress is first developed in a frame member.

SECTION A104
SYMBOLS AND NOTATIONS

[BS] A104.1 Symbols and notations. For the purpose of this chapter, the following notations supplement the applicable symbols and notations in the building code.

a_n = Diameter of core multiplied by its length or the area of the side of a square prism.

A = Cross-sectional area of unreinforced masonry pier or wall, square inches (10^{-6} m^2).

A_b = Total area of the bed joints above and below the test specimen for each in-place shear test, square inches (10^{-6} m^2).

A_n = Area of net mortared or grouted section of a wall or wall pier.

D = In-plane width dimension of pier, inches (10^{-3} m), or depth of diaphragm, feet (m).

DCR = Demand-capacity ratio specified in Section A111.4.2.

f'_m = Lower bound masonry compressive strength.

f_{sp} = Tensile-splitting strength of masonry.

F_{wx} = Force applied to a wall at level x, pounds (N).

H = Least clear height of opening on either side of a pier, inches (10^{-3} m).

h/t = Height-to-thickness ratio of URM wall. Height, h, is measured between wall anchorage levels and/or slab-on-grade.

L = Span of diaphragm between shear walls, or span between shear wall and open front, feet (m).

L_c = Length of crosswall, feet (m).

L_i = Effective diaphragm span for an open-front building specified in Section A111.8, feet (m).

P = Applied force as determined by standard test method of ASTM C496 or ASTM E519, pounds (N).

P_D = Superimposed dead load at the location under consideration, pounds (N). For determination of the rocking shear capacity, dead load at the top of the pier under consideration shall be used.

P_{D+L} = Stress resulting from the dead plus actual live load in place at the time of testing, pounds per square inch (kPa).

P_{test} = Splitting tensile test load determined by standard test method ASTM C496, pounds (N).

P_w = Weight of wall, pounds (N).

R = Response modification factor for Ordinary plain masonry shear walls in Bearing Wall System from Table 12.2-1 of ASCE 7, where R = 1.5.

S_{DS} = Design spectral acceleration at short period, in g units.

S_{D1} = Design spectral acceleration at 1-second period, in g units.

v_a = The shear strength of any URM pier, v_mA/1.5 pounds (N).

v_c = Unit shear strength for a crosswall sheathed with any of the materials given in Table A108.1(1) or A108.1(2), pounds per foot (N/m).

v_{mL} = Shear strength of unreinforced masonry, pounds per square inch (kPa).

V_{aa} = The shear strength of any URM pier or wall, pounds (N).

V_{ca} = Total shear capacity of crosswalls in the direction of analysis immediately above the diaphragm level being investigated, v_cL_c, pounds (N).

V_{cb} = Total shear capacity of crosswalls in the direction of analysis immediately below the diaphragm level being investigated, v_cL_c, pounds (N).

V_p = Shear force assigned to a pier on the basis of its relative shear rigidity, pounds (N).

V_r = Pier rocking shear capacity of any URM wall or wall pier, pounds (N).

v_{test} = Load at incipient cracking for each in-place shear test performed in accordance with Section ((~~A106.3.3.1~~)) A106.2.3.1, pounds (N).

v_{tl} = Lower bound mortar shear strength, pounds per square inch (kPa).

v_{to} = Mortar shear test values as specified in Section ((~~A106.3.3.5~~)) A106.2.3.5, pounds per square inch (kPa).

v_u = Unit shear capacity value for a diaphragm sheathed with any of the materials given in Table A108.1(1) or A108.1(2), pounds per foot (N/m).

V_{wx} = Total shear force resisted by a shear wall at the level under consideration, pounds (N).

W = Total seismic dead load as defined in the building code, pounds (N).

W_d = Total dead load tributary to a diaphragm level, pounds (N).

W_w = Total dead load of a URM wall above the level under consideration or above an open-front building, pounds (N).

W_{wx} = Dead load of a URM wall assigned to level x halfway above and below the level under consideration, pounds (N).

Σv_uD = Sum of diaphragm shear capacities of both ends of the diaphragm, pounds (N).

$\Sigma\Sigma v_uD$ = For diaphragms coupled with crosswalls, v_uD includes the sum of shear capacities of both ends of diaphragms coupled at and above the level under consideration, pounds (N).

ΣW_d = Total dead load of all the diaphragms at and above the level under consideration, pounds (N).

SECTION A105
GENERAL REQUIREMENTS

[BS] A105.1 General. The seismic force-resisting system specified in this chapter shall comply with the *International Building Code* and referenced standards, except as modified herein.

[BS] A105.2 Alterations and repairs. *Alterations* and *repairs* required to meet the provisions of this chapter shall comply with applicable structural requirements of the building code unless specifically provided for in this chapter.

[BS] A105.3 Requirements for plans. The following construction information shall be included in the plans required by this chapter:

1. Dimensioned floor and roof plans showing existing walls and the size and spacing of floor and roof-framing members and sheathing materials. The plans shall indicate all existing URM walls, and new crosswalls and shear walls, and their materials of construction. The location of these walls and their openings shall be fully dimensioned and drawn to scale on the plans.
2. Dimensioned URM wall elevations showing openings, piers, wall classes as defined in Section A106.2.3.8, thickness, heights, wall shear test locations, cracks or damaged portions requiring *repairs*, the general condition of the mortar joints, and if and where pointing is required. Where the exterior face is veneer, the type of veneer, its thickness and its bonding and/or ties to the structural wall masonry shall be noted.
3. The type of interior wall and ceiling materials, and framing.
4. The extent and type of existing wall anchorage to floors and roof where used in the design.

5. The extent and type of parapet corrections that were previously performed, if any.
6. *Repair* details, if any, of cracked or damaged unreinforced masonry walls required to resist forces specified in this chapter.
7. All other plans, sections and details necessary to delineate required retrofit construction.
8. The design procedure used shall be stated on both the plans and the permit application.
9. Details of the anchor prequalification program required by Section A107.5.3, if used, including location and results of all tests.
10. Quality assurance requirements of special inspection for all new construction materials and for retrofit construction including: anchor tests, pointing or repointing of mortar joints, installation of adhesive or mechanical anchors, and other elements as deemed necessary to ensure compliance with this chapter.

[BS] A105.4 Structural observation, testing and inspection. Structural observation, in accordance with Section 1704.5 of the *International Building Code*, shall be required for all structures in which seismic retrofit is being performed in accordance with this chapter. Structural observation shall include visual observation of work for compliance with the *approved* construction documents and confirmation of existing conditions assumed during design.

Structural testing and inspection for new and existing construction materials shall be in accordance with the building code, except as modified by this chapter.

Special inspection as described in Section A105.3, Item 10, shall be provided equivalent to Level 3 as prescribed in TMS 402, Table 3.1(2).

SECTION A106
MATERIALS REQUIREMENTS

[BS] A106.1 Condition of existing materials. Existing materials used as part of the required vertical load-carrying or seismic force-resisting system shall be evaluated by on-site investigation and: determined to be in good condition (free of degraded mortar, degraded masonry units or significant cracking); or shall be repaired, enhanced, retrofitted or removed and replaced with new materials. Mortar joint deterioration shall be patched by pointing or repointing of the eroded joint in accordance with Section A106.2.3.9. Existing significant cracks in solid unit unreinforced and solid grouted hollow unit masonry shall be repaired.

[BS] A106.2 Existing unreinforced masonry.

[BS] A106.2.1 General. Unreinforced masonry walls used to support vertical loads or seismic forces parallel and perpendicular to the wall plane shall be tested as specified in this section. Masonry that does not meet the minimum requirements established by this chapter shall be repaired, enhanced, removed and replaced with new materials, or alternatively, shall have its structural functions replaced with new materials and shall be anchored to supporting elements.

[BS] A106.2.2 Lay-up of walls. Unreinforced masonry walls shall be laid in a running bond pattern.

[BS] A106.2.2.1 Header in multiple-wythe solid brick. The facing and backing wythes of multiple-wythe walls shall be bonded so that not less than 10 percent of the exposed face area is composed of solid headers extending not less than 4 inches (102 mm) into the backing wythes. The clear distance between adjacent header courses shall not exceed 24 inches (610 mm) vertically or horizontally. Where backing consists of two or more wythes, the headers shall extend not less than 4 inches (102 mm) into the most distant wythe, or the backing wythes shall be bonded together with separate headers for which the area and spacing conform to the foregoing. Wythes of walls not meeting these requirements shall be considered to be veneer, and shall not be included in the effective thickness used in calculating the height-to-thickness ratio and the shear capacity strength of the wall.

Exception: Where SD1 is 0.3 g or less, veneer wythes anchored and made composite with backup masonry are permitted to be used for calculation of the effective thickness.

[BS] A106.2.2.2 Concrete masonry units and structural clay load-bearing tile. Grouted or ungrouted hollow concrete masonry units shall be tested in accordance with ASTM C140. Grouted or ungrouted structural clay load-bearing tile shall be tested in accordance with ASTM C34.

[S][BS] A106.2.2.3 Lay-up patterns. Lay-up patterns other than those specified in Section A106.2.2.1 are allowed if their performance can be justified to the *code official*.

[BS] A106.2.3 Testing of masonry.

[BS] A106.2.3.1 In-place mortar tests. Mortar shear test values, v_{to}, shall be obtained by one of the following:

1. ASTM C1531.
2. For masonry walls that have high shear strength mortar, or where in-place testing is not practical because of crushing or other failure mode of the masonry, alternative procedures for testing shall be used in accordance with Section A106.2.3.2.

CHAPTER A2

EARTHQUAKE HAZARD REDUCTION IN EXISTING REINFORCED CONCRETE AND REINFORCED MASONRY WALL BUILDINGS WITH FLEXIBLE DIAPHRAGMS

Appendix A2 is not adopted by The City of Seattle.

CHAPTER A5
REFERENCED STANDARDS

ASCE/SEI

American Society of Civil Engineers
Structural Engineering Institute
1801 Alexander Bell Drive
Reston, VA 20191-4400

7—16: Minimum Design Loads for Buildings and Other Structures with Supplement No. 1
A104, A403.3

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959

A36/A36M—14: Specification for Carbon Structural Steel
A405.3.3

A653/A653M—15: Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process
A304.2.6

B695—04(2009): Standard Specification for Coating of Zinc Mechanically Deposited on Iron And Steel
A304.2.6

C34—13: Specification for Structural Clay Load-Bearing Wall Tile
A106.2.2.2

C140/C140M—15: Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
A106.2.2.2

C496—96/C496M—11: Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
A104, A106.2.3.2

C1531—15: Standard Test Methods for In Situ Measurement of Masonry Mortar Joint Shear Strength Index
A106.2.3.1

E488/E488M—15: Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements
A107.5.3

E 488-10: Test Method for Strength of Anchors in Concrete and Masonry Elements
A107.5

E519/E519M—2010: Standard Test Method for Diagonal Tension (Shear) in Masonry Assemblages
A104, ((~~A106.3.3.2~~)) A106.2.3.2

ICC

International Code Council
500 New Jersey Avenue, NW
6th Floor
Washington, DC 20001

BNBC—99: BOCA National Building Code®
A202

IBC—00: International Building Code®
A202.1

IBC—03: International Building Code®
A202.1

IBC—06: International Building Code®
A202.1

IBC—09: International Building Code®
A202.1

APPENDIX B

SUPPLEMENTARY ACCESSIBILITY REQUIREMENTS FOR EXISTING BUILDINGS AND FACILITIES

Appendix B is not adopted by The City of Seattle.

APPENDIX C: Guidelines for the Wind Retrofit of Existing Buildings

CHAPTER C1

GABLE END RETROFIT FOR HIGH-WIND AREAS

Appendix C1 is not adopted by The City of Seattle.

CHAPTER C2

ROOF DECK FASTENING FOR HIGH-WIND AREAS

Appendix C2 is not adopted by The City of Seattle.

CHAPTER 1

SCOPE AND ADMINISTRATION

Note: Chapter 1 is entirely Seattle amendments to the *International Fuel Gas Code* and is not underlined.

SECTION 101
TITLE

101.1 Title. These regulations shall be known as the "Seattle Fuel Gas Code," may be cited as such, and are referred to herein as "this code." All references to the *International Fuel Gas Code* contained in this code mean the *Seattle Fuel Gas Code*.

SECTION 102
PURPOSE

102.1 Purpose. The purpose of this code is to provide minimum standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation, and maintenance or use of fuel gas systems within the City.

The purpose of this code is to provide for and promote the health, safety and welfare of the general public, and not to create or otherwise establish or designate any particular class or group of persons who will or should be especially protected or benefited by the terms of this code.

SECTION 103
APPLICABILITY AND SCOPE

103.1 Scope. This code applies to the erection, installation, alteration, repair, relocation, replacement, addition to, use or maintenance of fuel gas piping systems, fuel-gas utilization equipment and related accessories within the City. The design and testing of equipment regulated by this code are subject to the approval of the code official.

Exceptions:

1. Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories above grade plane with a separate means of egress and their accessory structures shall comply with the *International Residential Code*.
2. The standards for liquefied petroleum gas installations are the 2017 edition of NFPA 58 (*Liquefied Petroleum Gas Code*) and the 2018 edition of ANSI Z223.1/NFPA 54 (*National Fuel Gas Code*), as amended.

103.2 Applicability of city laws. A mechanical permit application shall be considered under the *Seattle Mechanical, Fuel Gas* and *Energy* codes in effect on a date as provided below, or on a date as otherwise required by law.

1. Mechanical permit applications shall be considered under the codes in effect on the date used to determine the codes applicable to the building permit application according to *Seattle Building Code* Section 101.3 if any of Items 1.1 through 1.3 apply:
   - 1.1 The mechanical permit application is submitted as part of a building permit application;
   - 1.2 The mechanical permit application is for work directly associated with a building permit but is submitted separately from the building permit application; or
   - 1.3 The mechanical permit application is for initial tenant alterations submitted no later than 18 months after the date of the approved final inspection for the building, and is submitted before the expiration date of the building permit for the tenant alteration, as determined by *Seattle Building Code* Section 106.9.
2. Mechanical permit applications other than those subject to Item 1 shall be considered under the codes in effect on the date a complete mechanical permit application is submitted that complies with all the requirements of Section 114.

103.3 Additions, alterations and repairs. Additions, alterations, repairs and replacement of equipment or systems shall comply with the provisions for new equipment and systems except as otherwise provided in Section 104 of this code.

103.4 Internal consistency. If in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive governs. If there is a conflict between a general requirement and a specific requirement, the specific requirement governs.

103.5 Referenced codes and standards. The codes and standards referenced in this code are part of the requirements of this code to the extent prescribed by each such reference. If differences occur between provisions of this code and referenced codes and standards, the provisions of this code apply.

Exception: Where enforcement of a code provision would violate the conditions of the listing of the equipment or appliance, the conditions of the listing and manufacturer's instructions apply.

103.6 Appendices. Provisions in the *International Fuel Gas Code* appendices do not apply unless specifically adopted.

103.7 Metric units. Wherever in this code there is a conflict between metric units of measurement and U.S. customary units, the U.S. customary units govern.

103.8 References to other codes. Whenever an International, National or Uniform Code is referenced in this code, it means the Seattle edition of that code, including local amendments. References to the "Building Code", "Mechanical Code", "Fire Code", "Residential Code" and "Plumbing Code" mean the Seattle editions of those codes.

SECTION 104
APPLICATION TO EXISTING MECHANICAL SYSTEMS

104.1 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs may be made to any mechanical system without requiring the existing mechanical system to comply with all the requirements of this code, if the addition, alteration, renovation or repair conforms to the standards required for a new mechanical system. Additions, alterations, renovations or repairs shall not cause an existing system to become unsafe, unhealthy or overloaded.

Minor additions, alterations, renovations, and repairs to existing mechanical systems may be installed in accordance with the law in effect at the time the original installation was made, if approved by the code official.

104.2 Existing installations. Mechanical systems lawful at the time of the adoption of this code may continue their use, be maintained or repaired, be converted to another type of fuel, or have components replaced if the use, maintenance, repair, conversion of fuel, or component replacement is done in accordance with the basic original design and location, and no hazard to life, health or property has been or is created by such mechanical system.

104.3 Changes in building occupancy. Mechanical systems that are a part of a building or structure undergoing a change in use or occupancy as defined in the *International Building Code* shall comply with all requirements of this code that are applicable to the new use or occupancy.

104.4 Maintenance. All mechanical systems, materials, equipment, appurtenances and all parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe and hazard-free condition. All devices or safeguards that were required by a code in effect when the mechanical system was installed shall be maintained in conformance with the code edition under which installed. The owner or the owner's authorized agent is responsible for maintenance of mechanical systems and equipment. To determine compliance with this subsection, the code official may cause a mechanical system or equipment to be reinspected.

The fire chief and the code official each have authority to obtain compliance with the requirements of this subsection.

Exception: The code official may modify the requirements of this section where all or a portion of the building is unoccupied.

104.5 Moved buildings. Building or structures moved into or within the City shall comply with standards adopted by the code official. No building shall be moved into or within the City unless, prior to moving, the code official has inspected the building for compliance with this code and the permit holder has agreed to correct all deficiencies found and has been issued a building permit for the work. A bond or cash deposit in an amount sufficient to abate or demolish the building shall be posted prior to issuance of a permit. See Section 114 for information required on plans. Any moved building that is not in complete compliance with standards for moved buildings within eighteen months from the date of permit issuance and is found to be a public nuisance may be abated.

104.6 Landmarks—Historic buildings and structures. The code official may modify the specific requirements of this code as it applies to landmarks and require in lieu thereof alternate requirements that, in the opinion of the code official, will result in a reasonable degree of safety to the public and the occupants of those buildings.

For purposes of this section a landmark is a building or structure that is subject to a requirement to obtain a certificate of approval from the City Landmarks Preservation Board before altering or making significant changes to specific features or characteristics, that has been nominated for designation and the City Landmarks Preservation Board has not issued a determination regarding designation, that has been designated for preservation by the City Landmarks Preservation Board, that has been designated for preservation by the State of Washington, that has been listed or determined eligible to be listed in the National Register of Historic Places, or that is located in a landmark or special review district subject to a requirement to obtain a certificate of approval before making a change to the external appearance of a structure.

SECTION 105
ALTERNATE MATERIALS AND METHODS OF CONSTRUCTION

105.1 Alternate materials and methods of construction and design. This code does not prevent the use of any material, design or method of construction not specifically allowed or prohibited by this code, provided the alternate has been approved and its use authorized by the code official. The code official may approve an alternate, provided the code official finds that the proposed alternate complies with the provisions of this code and that the alternate, when considered together with other safety features of the building or other relevant circumstances, will provide at least an equivalent level of strength, effectiveness, fire resistance, durability, safety and sanitation. The code official may require that sufficient evidence or proof be submitted to reasonably substantiate any claims regarding the use or suitability of the alternate. The code official may, but is not required to, record the approval of alternates and any relevant information in the files of the code official or on the approved construction documents.

SECTION 106
MODIFICATIONS

106.1 Modifications. The code official may modify the provisions of this code for individual cases if the code official finds: (1) there are practical difficulties involved in carrying out the provisions of this code; (2) the modification is in conformity with the intent and purpose of this code; and (3) the modification will provide a reasonable level of strength, effectiveness, fire resistance, durability, safety and sanitation when considered together with other safety features of the building or other relevant circumstances. The code official may, but is not required to, record the approval of modifications and any relevant information in the files of the code official or on the approved construction documents.

SECTION 107
TESTS

107.1 Tests. Whenever there is insufficient evidence of compliance with the provisions of this code or evidence that any material or method of construction does not conform to the requirements of this code, the code official may require tests as proof of compliance, to be made at no expense to the City. Test methods shall be as specified in this code or by other recognized test standards. If there are no recognized and accepted test methods for the proposed alternate, the code official shall determine the test procedures. All tests shall be made by an approved agency. Reports of such tests shall be retained by the code official for the period required for retention of public records.

SECTION 108
ORGANIZATION AND DUTIES OF CODE OFFICIAL

108.1 Jurisdiction of the Department of Construction and Inspections. The Department of Construction and Inspections is authorized to administer and enforce this code. Enforcement of Chapters 4 and 7 are the primary responsibility of the Director of Public Health. The Department of Construction and Inspections is under the administrative and operational control of the Director, who is the code official.

108.2 Designees. The code official may appoint such officers, inspectors, assistants and employees as are authorized from time to time. The code official may authorize such employees and other agents as may be necessary to carry out the functions of the code official.

108.3 Right of entry. With the consent of the owner or occupier of a building or premises, or pursuant to a lawfully issued warrant, the code official may enter a building or premises at any reasonable time to perform the duties imposed by this code.

108.4 Liability. Nothing in this code is intended to be nor shall be construed to create or form the basis for any liability on the part of the City, or its officers, employees or agents, for any injury or damage resulting from the failure of equipment to conform to the provisions of this code, or by reason or as a consequence of any inspection, notice, order, certificate, permission or approval authorized or issued or done in connection with the implementation or enforcement of this code, or by reason of any action or inaction on the part of the City related in any manner to the enforcement of this code by its officers, employees or agents.

This code shall not be construed to lessen or relieve the responsibility of any person owning, operating or controlling any equipment, building or structure for any damages to persons or property caused by defects, nor shall the Seattle Department of Construction and Inspections or the City of Seattle be held to have assumed any such liability by reason of the inspections authorized by this code or any permits or certificates issued under this code.

108.5 Responsibility for compliance. Compliance with the requirements of this code is the obligation of the owner of the building, structure or premises, the authorized agent of the owner, and other persons responsible for the condition or work, and not of the City or any of its officers, employees or agents.

SECTION 109
UNSAFE EQUIPMENT AND HAZARD CORRECTION ORDER

109.1 Emergency order. Whenever the code official finds that any equipment regulated by this code is in such a dangerous and unsafe condition as to constitute an imminent hazard to life or limb, the code official may issue an emergency order. The emergency order may (1) direct that the equipment be restored to a safe condition by a date certain; (2) require that the building, structure or premises, or portion thereof, containing the equipment be vacated within a reasonable time to be specified in the order, or in the case of extreme danger, the order may specify immediate vacation of the building, structure or premises, or portion thereof; or (3) authorize immediate disconnection of the utilities or energy source.

109.1.1 Service of emergency order. The order shall be posted on the premises or personally served on the owner of the building or premises or any person responsible for the condition. The order shall specify the time for compliance.

109.1.2 Effect of emergency order. No person may occupy a building, structure or premises, or portion thereof, after the date on which the building is required to be vacated until the building, structure or premises, or portion thereof, is restored to a safe condition as required by the order and this code. It is a violation for any person to fail to comply with an emergency order issued by the code official.

109.2 Hazard correction order. Whenever the code official finds that unsafe equipment exists, the code official may issue a hazard correction order specifying the conditions causing the equipment to be unsafe and directing the owner or other person responsible for the unsafe equipment to correct the condition by a date certain. In lieu of correction, the owner may submit a report or analysis to the code official analyzing said conditions and establishing that the equipment is, in fact, safe. The code official may require that the report or analysis be prepared by a licensed engineer.

109.2.1 Service of hazard correction order. The order shall be served upon the owner, agent or other responsible person by personal service or regular first class mail addressed to the last known address of such person or if no address is available after reasonable inquiry, the order may be posted in a conspicuous place on the premises. The order may also be posted if served by personal service or first class mail.

109.2.2 Effect of hazard correction order. It is a violation for any person to fail to comply with a hazard correction order as specified in this subsection.

SECTION 110
ENFORCEMENT, VIOLATIONS AND PENALTIES

110.1 Violations. It is a violation of this code for any person to:

1. Install, erect, construct, enlarge, alter, repair, replace, remodel, move, improve, remove, convert or demolish, equip, occupy, use or maintain any mechanical system or equipment, or cause or permit the same to be done, in the City, contrary to or in violation of any of the provisions of this code.
2. Knowingly aid, abet, counsel, encourage, hire, induce or otherwise procure another to violate or fail to comply with this code.
3. Use any material or install any device, appliance or equipment that is subject to this code and has not been approved by the code official.
4. Violate or fail to comply with any order issued by the code official pursuant to the provisions of this code or with any requirements of this code.
5. Remove, mutilate, destroy or conceal any notice or order issued or posted by the code official pursuant to the provisions of this code, or any notice or order issued or posted by the code official in response to a natural disaster or other emergency.
6. Conduct work under a permit without requesting an inspection as required by Section 116.

110.2 Notice of violation. If, after investigation, the code official determines that standards or requirements of this code have been violated or that orders or requirements have not been complied with, the code official may issue a notice of violation upon the owner, agent, or other person responsible for the action or condition. The notice of violation shall state the standards or requirements violated, shall state what corrective action, if any, is necessary to comply with the standards or requirements, and shall set a reasonable time for compliance.

110.2.1 Service of notice of violation. The notice shall be served upon the owner, agent or other responsible person by personal service or regular first class mail addressed to the last known address of such person, or if no address is available after reasonable inquiry, the notice may be posted in a conspicuous place on the premises. The notice may also be posted if served by personal service or first class mail. Nothing in this section limits or precludes any action or proceeding to enforce this code, and nothing obligates or requires the code official to issue a notice of violation prior to the imposition of civil or criminal penalties.

110.2.2 Review of notice of violation by the code official. Any person affected by a notice of violation issued pursuant to Section 110.2 may obtain a review of the notice by making a request in writing to the code official within ten days after ser-

vice of the notice. When the last day of the period computed is a Saturday, Sunday, or city holiday, the period runs until 5 p.m. of the next business day.

110.2.2.1 Review procedure. The review shall occur not less than ten nor more than 20 days after the request is received by the code official unless otherwise agreed to by the person requesting the review. Any person affected by the notice of violation may submit additional information to the code official. The review shall be made by a representative of the code official who will review any additional information that is submitted and the basis for issuance of the notice of violation. The reviewer may request clarification of the information received and a site visit.

110.2.2.2 Decision. After the review, the code official shall:

1. Sustain the notice;
2. Withdraw the notice;
3. Amend the notice; or
4. Continue the review to a date certain.

110.2.2.3 Order. The code official shall issue an order containing the decision within 15 days of the date that the review is completed and shall cause the order to be mailed by regular first class mail to the persons requesting the review and the persons named on the notice of violation, addressed to their last known address.

110.3 Stop work orders. The code official may issue a stop work order whenever any work is being done contrary to the provisions of this code, or contrary to a permit issued by the code official, or in the event of dangerous or unsafe conditions related to equipment or construction. The stop work order shall identify the violation and may prohibit work or other activity on the site.

110.3.1 Service of stop work order. The code official shall serve the stop work order by posting it in a conspicuous place at the site. If posting is not physically possible, the stop work order may be served by personal service or by regular first class mail to the last known address of: the property owner, the person doing or causing the work to be done, or the holder of a permit if work is being stopped on a permit. For purposes of this section, service is complete at the time of posting or of personal service, or if mailed, three days after the date of mailing. When the last day of the period so computed is a Saturday, Sunday or city holiday, the period runs until 5 p.m. on the next business day.

110.3.2 Effective date of stop work order. Stop work orders are effective when posted, or if posting is not physically possible, when one of the persons identified in Section 110.3.1 is served.

110.3.3 Review of stop work orders by the code official. Any person aggrieved by a stop work order may obtain a review of the order by delivering to the code official a request in writing within two business days of the date of service of the stop work order.

110.3.3.1 Review procedure. The review shall occur within two business days after receipt by the code official of the request for review unless otherwise agreed by the person making the request. Any person affected by the stop work order may submit additional information to the code official for consideration as part of the review at any time prior to the review. The review will be made by a representative of the code official who will review all additional information received and may also request a site visit.

110.3.3.2 Decision. After the review, the code official may:

1. Sustain the stop work order;
2. Withdraw the stop work order;
3. Modify the stop work order; or
4. Continue the review to a date certain.

110.3.3.3 Order. The code official shall issue an order containing the decision within two business days after the review is completed and shall cause the order to be sent by regular first class mail to the person or persons requesting the review, any person on whom the stop work order was served, and any other person who requested a copy before issuance of the order, addressed to their last known address.

110.4 Authority to disconnect utilities in emergencies. The code official has the authority to disconnect fuel-gas utility service or energy supplies to a building, structure, premises or equipment regulated by this code in case of emergency where necessary to eliminate an immediate hazard to life or property. The code official may enter any building or premises to disconnect utility service. The code official shall, whenever possible, notify the serving utility, the owner and the occupant of the building, structure or premises of the decision to disconnect prior to taking such action, and shall notify the serving utility, owner and occupant of the building, structure or premises in writing of such disconnection immediately thereafter.

110.5 Authority to condemn equipment. Whenever the code official determines that any equipment or portion thereof regulated by this code is hazardous to life, health or property, the code official shall order in writing that such equipment either be disconnected, removed or restored to a safe or sanitary condition, as appropriate. The written notice shall fix a date certain for compliance with such order. It is a violation for any person to use or maintain defective equipment after receiving such notice.

When any equipment or installation is to be disconnected, the code official shall give written notice of such disconnection and causes therefore within 24 hours to the serving utility, the owner and the occupant of the building, structure or premises. When any equipment is maintained in violation of this code, and in violation of a notice issued pursuant to the provisions of this section, the code official shall institute any appropriate action to prevent, restrain, correct or abate the violation.

110.6 Connection after order to disconnect. No person shall make connections from any energy, fuel or power supply nor supply energy or fuel to any equipment regulated by this code that has been disconnected or ordered to be disconnected by the code official, or the use of which has been ordered to be discontinued by the code official until the code official authorizes the reconnection and use of such equipment.

110.7 Civil penalties. Any person violating or failing to comply with the provisions of this code is subject to a cumulative civil penalty in an amount not to exceed $500 per day for each violation from the date the violation occurs or begins until compliance is achieved. In cases where the code official has issued a notice of violation, the violation will be deemed to begin, for purposes of determining the number of days of violation, on the date compliance is required by the notice of violation.

110.8 Enforcement in Municipal Court. Civil actions to enforce this code shall be brought exclusively in Seattle Municipal Court, except as otherwise required by law or court rule. In any civil action for a penalty, the City has the burden of proving by a preponderance of the evidence that a violation exists or existed; the issuance of a notice of violation or of an order following a review by the code official is not itself evidence that a violation exists.

110.9 Judicial review. Because civil actions to enforce this code must be brought exclusively in Seattle Municipal Court pursuant to Section 110.8, orders of the code official, including notices of violation issued under this chapter, are not subject to judicial review pursuant to chapter 36.70C RCW.

110.10 Alternative criminal penalty. Anyone who violates or fails to comply with any notice of violation or order issued by the code official pursuant to this code or who removes, mutilates, destroys or conceals a notice issued or posted by the code official shall, upon conviction thereof, be punished by a fine of not more than $5000 or by imprisonment for not more than 365 days, or by both such fine and imprisonment for each separate violation. Each day's violation shall constitute a separate offense.

110.11 Additional relief. The code official may seek legal or equitable relief to enjoin any acts or practices and abate any condition when necessary to achieve compliance.

110.12 Administrative review by the code official. Prior to issuance of the mechanical permit, applicants may request administrative review by the code official of decisions or actions pertaining to the administration and enforcement of this code. Requests shall be addressed to the code official.

110.13 Administrative review by the Construction Codes Advisory Board. After administrative review by the code official, and prior to issuance of the mechanical permit, applicants may request review of decisions or actions pertaining to the application and interpretation of this code by the Construction Codes Advisory Board according to *International Building Code* Section 103.11, except for stop work orders, notices of violations and revocations of permits. The review will be performed by three or more members of the Construction Codes Advisory Board, chosen by the Board Chair. The Chair shall consider the subject of the review and members' expertise when selecting members to conduct a review. The decision of the review panel is advisory only; the final decision is made by the code official.

110.14 Recording. The code official may record a copy of any order or notice with the Department of Records and Elections of King County.

110.15 Appeal to Superior Court. Final decisions of the Seattle Municipal Court on enforcement actions authorized by Title 22 and this code may be appealed pursuant to the Rules for Appeal of Decisions of Courts of Limited Jurisdiction.

SECTION 111
RULES OF THE CODE OFFICIAL

111.1 Authority. The code official has authority to issue interpretations of this code and to adopt and enforce rules and regulations supplemental to this code as may be deemed necessary to clarify the application of the provisions of this code. Such interpretations, rules and regulations shall be in conformity with the intent and purpose of this code.

111.2 Procedure for adoption of rules. The code official shall promulgate, adopt and issue rules according to the procedures specified in the Administrative Code, Chapter 3.02 of the *Seattle Municipal Code*.

SECTION 112
CONSTRUCTION CODES ADVISORY BOARD

112.1 Construction Codes Advisory Board committee. A committee of the Construction Codes Advisory Board may examine proposed administrative rules and amendments relating to this code and related provisions of other codes and make recommendations to the code official and to the City Council for changes in this code. The committee will be called on as needed by the Construction Codes Advisory Board.

SECTION 113
PERMITS

113.1 Permits required. Except as otherwise specifically provided in this code, a permit shall be obtained from the code official prior to each installation, alteration, repair, replacement or remodel of any equipment or mechanical system regulated by this code. A separate mechanical permit is required for each separate building or structure.

113.2 Work exempt from permit. A mechanical permit is not required for the work listed below.

1. Any portable heating appliance, portable ventilating equipment, or portable cooling unit, if the total capacity of these portable appliances does not exceed 40 percent of the cumulative heating, cooling or ventilating requirements of a building or dwelling unit and does not exceed 3 kW or 10,000 Btu input.
2. Any closed system of steam, hot or chilled water piping within heating or cooling equipment regulated by this code.
3. Minor work or the replacement of any component part of a mechanical system that does not alter its original approval and complies with other applicable requirements of this code.

113.3 Compliance required. All work shall comply with this code, even where no permit is required.

113.4 Flood hazard areas. In addition to the permit required by this section, all work to be performed in areas of special flood hazard as defined in Chapter 25.06 of the *Seattle Municipal Code*, subject to additional standards and requirements set forth in Chapter 25.06, the Seattle Floodplain Development Ordinance.

113.5 Emergency repairs. In the case of an emergency, the installation, alteration or repair of any refrigeration system or equipment may be made without a permit, provided that application for a permit is made within the later of 24 hours or one working day from the time when the emergency work was started.

SECTION 114
APPLICATION FOR PERMIT

114.1 Application. To obtain a permit, the applicant shall first file an application in a format determined by the code official. Every such application shall:

1. Identify and describe the work to be covered by the permit for which application is made.
2. Describe the land on which the proposed work is to be done by legal description, property address or similar description that will readily identify and definitely locate the proposed building or work.
3. Provide the contractor's business name, address, phone number and current contractor registration number (required if contractor has been selected).
4. Be accompanied by construction documents, including plans, diagrams, computations and specifications, equipment schedules and other data as required in Sections 114.2 and 114.3.
5. State the valuation of the mechanical work to be done. The valuation of the mechanical work is the estimated current value of all labor and material, whether actually paid for or not, for which the permit is sought.
6. Be signed by the owner of the property or building, or the owner's authorized agent, who may be required to submit evidence to indicate such authority.
7. Give such other data and information as may be required by the code official.
8. State the name of the owner and contractor and the name, address and phone number of a contact person.
9. Substantially conform with applicable law in effect on the date described in Section R101.3, as modified by any exception.

114.2 Construction documents. Construction documents shall be submitted in one or more sets with each application for a permit, or shall be submitted in electronic format determined by the code official. The code official may require plans, computations and specifications to be prepared and designed by an engineer or architect licensed by the state to practice as such. Projects having a total mechanical valuation of $50,000 or larger shall have a mechanical engineering stamp and signature on each sheet.

Exception: A mechanical engineer's stamp or submission of construction documents is not required if the code official finds that the nature of the work applied for is such that review of construction documents is not necessary to obtain compliance with this code.

114.3 Information on construction documents.

114.3.1 Clarity of plans. Plans shall be drawn to a clearly indicated and commonly accepted scale in a format determined by the code official.

114.3.2 Fire-resistive notes. The code official may require that plans for buildings more than two stories in height of other than Group R-3 and Group U occupancies indicate how required structural and fire-resistive integrity will be maintained

where a penetration will be made for electrical, mechanical, plumbing and communication conduits, pipes and similar systems.

114.3.3 Information required on plans. The plans or specifications shall show the following:

1. Layout for each floor with dimensions of all working spaces and a legend of all symbols used.
2. Location, size and material of all piping.
3. Location, size and materials of all air ducts, air inlets and air outlets.
4. Location of all fans, warm-air furnaces, boilers, absorption units, refrigerant compressors and condensers and the weight of all pieces of such equipment weighing 200 pounds or more.
5. Rated capacity or horsepower and efficiency rating of all boilers, warm-air furnaces, heat exchangers, blower fans, refrigerant compressors and absorption units. See also the *International Energy Conservation Code*.
6. Location, size and material of all combustion products vents and chimneys.
7. Location and area of all ventilation and combustion air openings and ducts.
8. Location of all air dampers and fire shutters.
9. The first sheet of each set of plans and specifications shall show the address of the proposed work and the name and address of the owner or lessee of the premises.
10. Architectural drawings, typical envelope cross sections and other drawings or data may be required to support system sizing calculations or other thermal requirements of this code or the *International Energy Conservation Code*.

SECTION 115
APPLICATION REVIEW AND PERMIT ISSUANCE

115.1 Issuance. The application and construction documents shall be reviewed by the code official. The construction documents may be reviewed by other departments of the City to check compliance with the laws and ordinances under their jurisdiction.

115.1.1 Issuance of permit. The code official shall issue a permit to the applicant if the code official finds the following:

1. The work described in the construction documents substantially conforms to the requirements of this code and other pertinent laws and ordinances;
2. The fees specified in the *Seattle Municipal Code*, Title 22, Subtitle IX, Permit Fees have been paid; and
3. The applicant has complied with all requirements to be performed prior to issuance of a permit for the work under other pertinent laws, ordinances or regulations or included in a master use permit, or otherwise imposed by the building official.

When the permit is issued, the applicant or the applicant's authorized agent becomes the permit holder.

115.1.2 Compliance with approved construction documents. When the code official issues a permit, the code official shall endorse the permit in writing or in electronic format and stamp the plans "APPROVED." Such approved plans and permit shall not be changed, modified or altered without authorization from the code official, and all work shall be done in accordance with the approved construction documents and permit except as authorized by the code official during field inspection to correct errors or omissions, or as authorized by Section 115.2.

115.2 Revisions to the permit. When changes to the approved work are made during construction, approval of the code official shall be obtained prior to execution. The building or mechanical inspector may approve minor changes for work not reducing the structural strength or fire and life safety of the structure. The building or mechanical inspector shall determine if it is necessary to revise the approved construction documents. If revised plans are required, changes shall be submitted to and approved by the code official, accompanied by fees specified in the *Seattle Municipal Code*, Title 22, Subtitle IX, Permit Fees prior to occupancy. All changes shall conform to the requirements of this code and other pertinent laws and ordinances and other issued permits.

Minor changes shall not incur additional fees if these changes do not (1) add to the general scope of work; (2) change the basic design concept; (3) involve major relocation of equipment, ducts, or pipes; (4) substantially alter approved equipment size; or (5) require extensive re-review of the plans and specifications.

115.3 Cancellation of permit applications. Applications may be cancelled if no permit is issued by the earlier of the following: (1) twelve months following the date of application; or (2) sixty days after the date of written notice that the permit is ready to be issued. After cancellation, construction documents may be returned to the applicant or destroyed by the code official.

The code official shall notify the applicant in writing at least 30 days before the application is cancelled. The notice shall specify a date by which a request for extension must be submitted in order to avoid cancellation. The date shall be at least two weeks prior to the date on which the application will be cancelled.

115.4 Extensions prior to permit issuance. At the discretion of the code official, applications for projects that require more than 12 months to review and approve may be extended for a period that provides reasonable time to complete the review and approval, but in no case longer than 24 months from the date of the original application. No application may be extended more than once. After cancellation, the applicant shall submit a new application and pay a new fee to restart the permit process.

Notwithstanding other provisions of this code, applications may be extended where issuance of the permit is delayed by litigation, preparation of environmental impact statements, appeals, strikes or other causes related to the application that are beyond the applicant's control, or while the applicant is making progress toward issuance of a master use permit.

115.5 Retention of plans. One set of approved plans, which may be on microfilm or in electronic format, shall be retained by the code official. One set of approved plans shall be returned to the applicant and shall be kept at the site of the building or work for use by the inspection personnel at all times when the work authorized is in progress.

115.6 Validity of permit. The issuance or granting of a permit or approval of construction documents shall:

1. Not be construed to be a permit for, or an approval of, any violation of any of the provisions of this code or other pertinent laws and ordinances.
2. Not prevent the code official from requiring the correction of errors in the construction documents, or from preventing building operations being carried on thereunder when in violation of this code or of other pertinent laws and ordinances of the City.
3. Not prevent the code official from requiring correction of conditions found to be in violation of this code or other pertinent laws and ordinances of the City, or
4. Not be construed to extend the period of time for which any such permit is issued or otherwise affect any period of time for compliance specified in any notice or order issued by the code official or other administrative authority requiring the correction of any such conditions.

115.7 Expiration of permits. Authority to do the work authorized by a permit expires 18 months from the date of issuance. An approved renewal extends the life of a permit for an additional 18 months from the prior expiration date. An approved reestablishment extends the life of the permit for 18 months from the date the permit expired.

Exceptions:

1. Initial permits for major construction projects that require more than 18 months to complete may be issued for a period that provides reasonable time to complete the work, according to an approved construction schedule. The building official may authorize a permit expiration date not to exceed three years from the date of issuance.
2. The code official may issue permits that expire in less than 18 months if the code official determines a shorter period is appropriate to complete the work.

115.8 Renewal of permits. Permits may be renewed and renewed permits may be further renewed by the code official, if the following conditions are met:

1. Application for renewal is made within the 30 day period immediately preceding the date of expiration of the permit; and
2. If the project has had an associated discretionary Land Use review, and the land use approval has not expired; and
3. If an application for renewal is made more than 18 months after the date of mandatory compliance with a new or revised edition of this code, the permit shall not be renewed unless:

   3.1 The code official determines that the permit complies, or is modified to comply with the *Seattle Mechanical, Fuel Gas* and *Energy codes* in effect on the date of application for renewal; or

   3.2 The work authorized by the permit is substantially underway and progressing at a rate approved by the building official. "Substantially underway" means that normally required inspections have been approved for work such as foundations, framing, mechanical, insulation and finish work is being completed on a continuing basis; or

   3.3 Commencement or completion of the work authorized by the permit is delayed by litigation, appeals, strikes or other extraordinary circumstances related to the work authorized by the permit, beyond the permit holder's control, subject to approval by the code official.

115.9 Reestablishment of expired permits. A new permit is required to complete work if a permit has expired and was not renewed.

Exception: A permit that expired less than one year prior to the date of a request for reestablishment may be reestablished upon approval of the code official if it complies with Items 2 and 3 of Section 115.8. Once re-established the permit will not be considered to have expired. The new expiration date of a re-established permit shall be determined in accordance with Section 115.7.

115.10 Revocation of mechanical permits. Whenever the code official determines there are grounds for revoking a permit, the code official may issue a notice of revocation. The notice of revocation shall identify the reason for the proposed revocation, including, but not limited to, the violations, the conditions violated, and any alleged false or misleading information provided.

115.10.1 Standards for revocation. The code official may revoke a permit if:

1. The code or the permit has been or is being violated and issuance of a notice of violation or stop work order has been or would be ineffective to secure compliance because of circumstances related to the violation; or
2. The permit was obtained with false or misleading information.

115.10.2 Service of notice of revocation. The notice of revocation shall be served upon the owner, agent or other responsible person by personal service or regular first class mail addressed to the last known address of such person or if no address is available after reasonable inquiry, the notice may be posted in a conspicuous place on the premises. The notice may also be posted if served by personal service or first class mail.

115.10.3 Effective date of revocation. The code official shall identify in the notice of revocation a date certain on which the revocation will take effect. This date may be stayed pending complete review by the code official pursuant to Section 115.10.4.

115.10.4 Review by the code official for notice of revocation. Any person aggrieved by a notice of revocation may obtain a review by making a request in writing to the code official within three business days of the date of service of the notice of revocation. The review shall occur within five business days after receipt by the building official of the request for review. Any person affected by the notice of revocation may submit additional information to the building official for consideration as part of the review at any time prior to the review.

115.10.4.1 Review procedure. The review will be made by a representative of the code official who will review all additional information received and may also request a site visit. After the review, the code official may:

1. Sustain the notice of revocation and affirm or modify the date the revocation will take effect;
2. Withdraw the notice of revocation;
3. Modify the notice of revocation and affirm or modify the date the revocation will take effect; or
4. Continue the review to a date certain.

115.10.4.2 Order of revocation of permit. The code official shall issue an order containing the decision within ten days after the review is completed and shall cause the same to be sent by regular first class mail to the person or persons requesting the review, any other person on whom the notice of revocation was served, and any other person who requested a copy before issuance of the order. The order of the building official is the final order of the City, and the City and all parties shall be bound by the order.

SECTION 116
INSPECTIONS

116.1 General. All construction or work for which a permit is required is subject to inspection by the code official, and certain types of construction shall have special inspections by registered special inspectors specified in Chapter 17 of the *International Building Code*. In addition to the "called" inspections specified above, the code official may make or require any other inspections of any mechanical work to ascertain compliance with the provisions of this code and other laws and ordinances that are enforced by the code official.

116.2 Inspection requests. The owner of the property or the owner's authorized agent, or the person designated by the owner or agent to do the work authorized by a permit shall notify the code official that work requiring inspection as specified in this section and Section 120 is ready for inspection.

116.3 Access for inspection. The permit holder and the person requesting any inspections required by this code shall provide access to and means for proper inspection of such work, including safety equipment required by the Washington Industrial Safety and Health Agency. The work shall remain accessible and exposed for inspection purposes until approved by the code official. Neither the code official nor the City shall be liable for expense entailed in the required removal or replacement of any material to allow inspection.

116.4 Inspection record. Work requiring a mechanical permit shall not be commenced until the permit holder or the permit holder's agent has posted an inspection record in a conspicuous place on the premises and in a position that allows the code official to conveniently make the required entries regarding inspection of the work. This record shall be maintained in such a position by the permit holder or the permit holder's agent until final approval has been granted by the code official.

116.5 Approvals required. No work shall be done on any part of the building or structure beyond the point indicated in each successive inspection without first obtaining the written approval of the code official.

116.5.1 Effect of approval. Approval as a result of an inspection is not approval of any violation of the provisions of this code or of other pertinent laws and ordinances of the City. Inspections presuming to give authority to violate or cancel the provisions of this code or of other pertinent laws and ordinances of the City are not valid.

116.6 Final inspection. When the installation of a mechanical system is complete, an additional and final inspection shall be made.

116.7 Operation of mechanical equipment. The requirements of this section do not prohibit the operation of any mechanical systems installed to replace existing equipment or fixtures serving an occupied portion of the building in the event a request for inspection of such equipment or fixture has been filed with the code official not more than 48 hours after such replacement work is completed, and before any portion of such mechanical system is concealed by any permanent portion of the building.

116.8 Special investigation. If work that requires a permit or approval is commenced or performed prior to making formal application and receiving the code official's permission to proceed, the code official may make a special investigation inspection before a permit is issued for the work. If a special investigation is made, a special investigation fee may be assessed in accordance with the Fee Subtitle.

116.9 Reinspections. The code official may require a reinspection if work for which inspection is called is not complete, required corrections are not made, the inspection record is not properly posted on the work site, the approved plans are not readily available to the inspector, access is not provided on the date for which inspection is requested, if deviations from construction documents that require the approval of the code official have been made without proper approval, or as otherwise required by the code official.

116.9.1 Compliance with Section 104.4. For the purpose of determining compliance with Section 104.4, Maintenance, the code official or the fire chief may cause any structure or system to be reinspected.

116.9.2 Reinspection fee. The code official may assess a reinspection fee as set forth in the *Seattle Municipal Code*, Title 22, Subtitle IX, Permit Fees for any action for which reinspection is required. In instances where reinspection fees have been assessed, no additional inspection of the work will be performed until the required fees have been paid.

SECTION 117
CONNECTION APPROVAL

117.1 Energy connections. No person shall make connections from a source of energy fuel to a mechanical system or equipment regulated by this code for which a permit is required until approved by the code official.

117.2 Temporary connections. The code official may authorize temporary connection of the mechanical equipment to the source of energy fuel for the purpose of testing the equipment, or for use under a temporary certificate of occupancy.

SECTION 118
FEES

118.1 Fees. A fee for each mechanical permit and for other activities related to the enforcement of this code shall be paid as set forth in the *Seattle Municipal Code*, Title 22, Subtitle IX, Permit Fees.

CHAPTER 2

DEFINITIONS

SECTION 201 (IFGC)
GENERAL

201.1 Scope. Unless otherwise expressly stated, the following words and terms shall, for the purposes of this code and standard, have the meanings indicated in this chapter.

201.2 Interchangeability. Words used in the present tense include the future; words in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

[S] 201.3 Terms defined in other codes. Where terms are not defined in this code and are defined in the *International Building Code*, *International Fire Code*, *International Mechanical Code* or *((~~International~~))* *Uniform* *Plumbing Code*, such terms shall have meanings ascribed to them as in those codes.

201.4 Terms not defined. Where terms are not defined through the methods authorized by this section, such terms shall have ordinarily accepted meanings such as the context implies.

SECTION 202 (IFGC)
GENERAL DEFINITIONS

[M] ACCESS (TO). That which enables a device, *appliance* or *equipment* to be reached by ready *access* or by a means that first requires the removal or movement of a panel, door or similar obstruction (see also "Ready *access*").

AIR CONDITIONER, GAS-FIRED. A gas-burning, automatically operated *appliance* for supplying cooled air, dehumidified air, or both, or chilled liquid.

[M] AIR CONDITIONING. The treatment of air so as to control simultaneously the temperature, humidity, cleanness and distribution of the air to meet the requirements of a conditioned space.

[M] AIR, EXHAUST. Air being removed from any space or piece of *equipment* or *appliance* and conveyed directly to the atmosphere by means of openings or ducts.

[M] AIR-HANDLING UNIT. A blower or fan used for the purpose of distributing supply air to a room, space or area.

[M] AIR, MAKEUP. Any combination of outdoor and transfer air intended to replace exhaust air and exfiltration.

[A] ALTERATION. A change in a system that involves an extension, addition or change to the arrangement, type or purpose of the original installation.

ANODELESS RISER. A transition assembly in which plastic *piping* is installed and terminated above ground outside of a building.

[M] APPLIANCE. Any apparatus or device that utilizes a fuel or a raw material as a fuel to produce light, heat, power, refrigeration or air conditioning. Also, an apparatus that compresses fuel gases.

APPLIANCE, AUTOMATICALLY CONTROLLED. Appliances equipped with an automatic burner ignition and safety shutoff device and other automatic devices that accomplish complete turn-on and shutoff of the gas to the main burner or burners, and graduate the gas supply to the burner or burners, but do not affect complete shutoff of the gas.

APPLIANCE, FAN-ASSISTED COMBUSTION. An *appliance* equipped with an integral mechanical means to either draw or force products of combustion through the combustion chamber or heat exchanger.

APPLIANCE TYPE.

Low-heat appliance (residential appliance). Any *appliance* in which the products of combustion at the point of entrance to the flue under normal operating conditions have a temperature of 1,000°F (538°C) or less.

Medium-heat appliance. Any *appliance* in which the products of combustion at the point of entrance to the flue under normal operating conditions have a temperature of more than 1,000°F (538°C), but not greater than 2,000°F (1093°C).

APPLIANCE, UNVENTED. An *appliance* designed or installed in such a manner that the products of combustion are not conveyed by a vent or chimney directly to the outside atmosphere.

[M] APPLIANCE, VENTED. An *appliance* designed and installed in such a manner that all of the products of combustion are conveyed directly from the *appliance* to the outdoor atmosphere through an *approved* chimney or vent system.

[A] APPROVED. Acceptable to the code official.

[A] APPROVED AGENCY. An established and recognized agency that is regularly engaged in conducting tests, furnishing inspection services or furnishing certification, where such agency has been approved by the *code official*.

ATMOSPHERIC PRESSURE. The pressure of the weight of air and water vapor on the surface of the earth, approximately 14.7 pounds per square inch (psi) (101 kPa absolute) at sea level.

AUTOMATIC IGNITION. Ignition of gas at the burner(s) when the gas controlling device is turned on, including reignition if the flames on the burner(s) have been extinguished by means other than by the closing of the gas controlling device.

BAFFLE. An object placed in an *appliance* to change the direction of or retard the flow of air, air-gas mixtures or flue gases.

BAROMETRIC DRAFT REGULATOR. A balanced damper device attached to a chimney, vent connector, breeching or flue gas manifold to protect combustion appliances by controlling chimney draft. A double-acting barometric draft regulator is one whose balancing damper is free to move in either direction to protect combustion appliances from both excessive draft and back-draft.

[S] BOILER. ((~~**, LOW-PRESSURE.** A self-contained *appliance* for supplying steam or hot water.~~)) A closed vessel in which water is heated, steam is generated, steam is superheated, or any combination thereof, under pressure or vacuum by the direct application of heat. The term *boiler* shall also include fire unites for heating or vaporizing liquids other than water where these systems are complete within themselves.

((~~**Hot water heating boiler.** A boiler in which no steam is generated, from which hot water is circulated for heating purposes and then returned to the boiler, and that operates at water pressures not exceeding 160 pounds per square inch gauge (psig) (1100 kPa gauge) and at water temperatures not exceeding 250°F (121°C) at or near the boiler *outlet*.~~

~~**Hot water supply boiler.** A boiler, completely filled with water, which furnishes hot water to be used externally to itself, and that operates at water pressures not exceeding 160 psig (1100 kPa gauge) and at water temperatures not exceeding 250°F (121°C) at or near the boiler *outlet*.~~

~~**Steam heating boiler.** A boiler in which steam is generated and that operates at a steam pressure not exceeding 15 psig (100 kPa gauge).~~))

[S] BOILER CODE. The *Seattle Boiler and Pressure Vessel Code*.

BONDING JUMPER. A conductor installed to electrically connect metallic gas *piping* to the grounding electrode system.

[M] BRAZING. A metal-joining process wherein coalescence is produced by the use of a nonferrous filler metal having a melting point above 1,000°F (538°C), but lower than that of the base metal being joined. The filler material is distributed between the closely fitted surfaces of the joint by capillary action.

BROILER. A general term including salamanders, barbecues and other appliances cooking primarily by radiated heat, excepting toasters.

BTU. Abbreviation for British thermal unit, which is the quantity of heat required to raise the temperature of 1 pound (454 g) of water 1°F (0.56°C) (1 Btu = 1055 J).

BURNER. A device for the final conveyance of the gas, or a mixture of gas and air, to the combustion zone.

Induced-draft. A burner that depends on draft induced by a fan that is an integral part of the *appliance* and is located downstream from the burner.

Power. A burner in which gas, air or both are supplied at pressures exceeding, for gas, the line pressure, and for air, atmospheric pressure, with this added pressure being applied at the burner.

[M] CHIMNEY. A primarily vertical structure containing one or more flues, for the purpose of carrying gaseous products of combustion and air from an *appliance* to the outside atmosphere.

Factory-built chimney. A *listed* and *labeled* chimney composed of factory-made components, assembled in the field in accordance with manufacturer's instructions and the conditions of the listing.

Masonry chimney. A field-constructed chimney composed of solid masonry units, bricks, stones or concrete.

Metal chimney. A field-constructed chimney of metal.

[M] CLEARANCE. The minimum distance through air measured between the heat-producing surface of the mechanical *appliance*, device or *equipment* and the surface of the *combustible material* or *assembly*.

CLOTHES DRYER. An *appliance* used to dry wet laundry by means of heated air. Dryer classifications are as follows:

Type 1. Factory-built package, multiple production. Primarily used in family living environment. Usually the smallest unit physically and in function output.

Type 2. Factory-built package, multiple production. Used in business with direct intercourse of the function with the public. Not designed for use in individual family living environment.

[S][A] CODE. These regulations, subsequent amendments thereto or any emergency rule or regulation that ((~~the administrative authority having jurisdiction has lawfully~~)) have been adopted.

[S][A] CODE OFFICIAL. The ((~~officer or other designated authority charged with the administration and enforcement of this code,~~)) Director of the Seattle Department of Construction and Inspections or a duly authorized representative.

LOG LIGHTER. A manually operated solid fuel ignition *appliance* for installation in a vented solid fuel-burning *fireplace*.

LUBRICATED PLUG-TYPE VALVE. A valve of the plug and barrel type provided with means for maintaining a lubricant between the bearing surfaces.

MAIN BURNER. A device or group of devices essentially forming an integral unit for the final conveyance of gas or a mixture of gas and air to the combustion zone, and on which combustion takes place to accomplish the function for which the *appliance* is designed.

METER. The instrument installed to measure the volume of gas delivered through it.

MODULATING. Modulating or throttling is the action of a control from its maximum to minimum position in either predetermined steps or increments of movement as caused by its actuating medium.

[M] NONCOMBUSTIBLE MATERIALS. Materials that, where tested in accordance with ASTM E136, have not fewer than three of four specimens tested meeting all of the following criteria:

1. The recorded temperature of the surface and interior thermocouples shall not at any time during the test rise more than 54ºF (30ºC) above the furnace temperature at the beginning of the test.
2. There shall not be flaming from the specimen after the first 30 seconds.
3. If the weight loss of the specimen during testing exceeds 50 percent, the recorded temperature of the surface and interior thermocouples shall not at any time during the test rise above the furnace air temperature at the beginning of the test, and there shall not be flaming of the specimen.

[A] OCCUPANCY. The purpose for which a building, or portion thereof, is utilized or occupied.

[M] OFFSET (VENT). A combination of *approved* bends that makes two changes in direction bringing one section of the vent out of line but into a line parallel with the other section.

ORIFICE. The opening in a cap, spud or other device whereby the flow of gas is limited and through which the gas is discharged to the burner.

OUTLET. The point at which a gas-fired *appliance* connects to the gas *piping* system.

OXYGEN DEPLETION SAFETY SHUTOFF SYSTEM (ODS). A system designed to act to shut off the gas supply to the main and pilot burners if the oxygen in the surrounding atmosphere is reduced below a predetermined level.

[S] PERSON. Any individual, receiver, administrator, executor, assignee, trustee in bankruptcy, trust, estate, firm, partnership, joint venture, club, company, joint stock company, business trust, municipal corporation, political subdivision of the State of Washington, corporation, limited liability company, association, society or any group of individuals acting as a unit, whether mutual, cooperative, fraternal, nonprofit or otherwise, and the United States or any instrumentality thereof.

PILOT. A small flame that is utilized to ignite the gas at the main burner or burners.

[M] PIPING. Where used in this code, "*piping*" refers to either pipe or tubing, or both.

Pipe. A rigid conduit of iron, steel, copper, copper-alloy or plastic.

Tubing. Semirigid conduit of copper, copper-alloy aluminum, plastic or steel.

PIPING SYSTEM. The fuel *piping*, valves and fittings from the outlet of the *point of delivery* to the outlets of the *appliance* shutoff valves.

[M] PLASTIC, THERMOPLASTIC. A plastic that is capable of being repeatedly softened by increase of temperature and hardened by decrease of temperature.

POINT OF DELIVERY. For natural gas systems, the *point of delivery* is the outlet of the service meter assembly or the outlet of the service regulator or service shutoff valve where a meter is not provided. Where a valve is provided at the outlet of the service meter assembly, such valve shall be considered to be downstream of the *point of delivery*. For undiluted liquefied petroleum gas systems, the point of delivery shall be considered to be the outlet of the service pressure regulator, exclusive of line gas regulators, in the system.

PORTABLE FUEL CELL APPLIANCE. A fuel cell generator of electricity, which is not fixed in place. A portable fuel cell *appliance* utilizes a cord and plug connection to a grid-isolated load and has an integral fuel supply.

PRESSURE DROP. The loss in pressure due to friction or obstruction in pipes, valves, fittings, regulators and burners.

PRESSURE TEST. An operation performed to verify the gas-tight integrity of gas *piping* following its installation or modification.

PURGE. To free a gas conduit of air or gas, or a mixture of gas and air.

QUICK-DISCONNECT DEVICE. A hand-operated device that provides a means for connecting and disconnecting an *appliance* or an *appliance* connector to a gas supply and that is equipped with an automatic means to shut off the gas supply when the device is disconnected.

[M] READY ACCESS (TO). That which enables a device, *appliance* or *equipment* to be directly reached, without requiring the removal or movement of any panel, door or similar obstruction (see "*Access*").

Integral gas valve type. An automatic device, actuated by temperature changes, designed to control the gas supply to the burner(s) in order to maintain temperatures between predetermined limits, and in which the thermal actuating element is an integral part of the device.

1. Graduating thermostat. A thermostat in which the motion of the valve is approximately in direct proportion to the effective motion of the thermal element induced by temperature change.
2. Snap-acting thermostat. A thermostat in which the thermostatic valve travels instantly from the closed to the open position, and vice versa.

[P] THIRD-PARTY CERTIFICATION AGENCY. An approved agency operating a product or material certification system that incorporates initial product testing, assessment and surveillance of a manufacturer's quality control system.

[P] THIRD-PARTY CERTIFIED. Certification obtained by the manufacturer indicating that the function and performance characteristics of a product or material have been determined by testing and ongoing surveillance by an approved third-party certification agency. Assertion of certification is in the form of identification in accordance with the requirements of the third-party certification agency.

[P] THIRD-PARTY TESTED. Procedure by which an approved testing laboratory provides documentation that a product, material or system conforms to specified requirements.

TOILET, GAS-FIRED. A packaged and completely assembled appliance containing a toilet that incinerates refuse instead of flushing it away with water.

[M] TRANSITION FITTINGS, PLASTIC TO STEEL. An adapter for joining plastic pipe to steel pipe. The purpose of this fitting is to provide a permanent, pressure-tight connection between two materials that cannot be joined directly one to another.

UNIT HEATER. A self-contained, automatically controlled, vented, fuel-gas-burning, space-heating appliance, intended for installation in the space to be heated without the use of ducts, and having integral means for circulation of air.

UNLISTED BOILER. A boiler not *listed* by a nationally recognized testing agency.

[S] UNSAFE. Constituting a fire or health hazard or otherwise dangerous to human life, or constituting a hazard to safety, health or public welfare.

UNVENTED ROOM HEATER. An unvented heating *appliance* designed for stationary installation and utilized to provide comfort heating. Such appliances provide radiant heat or convection heat by gravity or fan circulation directly from the heater and do not utilize ducts.

VALVE. A device used in *piping* to control the gas supply to any section of a system of *piping* or to an *appliance*.

Appliance shutoff. A valve located in the *piping* system, used to isolate individual appliances for purposes such as service or replacement.

Automatic. An automatic or semiautomatic device consisting essentially of a valve and operator that control the gas supply to the burner(s) during operation of an *appliance*. The operator shall be actuated by application of gas pressure on a flexible diaphragm, by electrical means, by mechanical means, or by other *approved* means.

Automatic gas shutoff. A valve used in conjunction with an automatic gas shutoff device to shut off the gas supply to a water-heating system. It shall be constructed integrally with the gas shutoff device or shall be a separate assembly.

Individual main burner. A valve that controls the gas supply to an individual main burner.

Main burner control. A valve that controls the gas supply to the main burner manifold.

Manual main gas-control. A manually operated valve in the gas line for the purpose of completely turning on or shutting off the gas supply to the *appliance*, except to pilot or pilots that are provided with independent shutoff.

Manual reset. An automatic shutoff valve installed in the gas supply *piping* and set to shut off when unsafe conditions occur. The device remains closed until manually reopened.

Service shutoff. A valve, installed by the serving gas supplier between the service meter or source of supply and the customer *piping* system, to shut off the entire *piping* system.

VENT. A pipe or other conduit composed of factory-made components, containing a passageway for conveying combustion products and air to the atmosphere, *listed* and *labeled* for use with a specific type or class of *appliance*.

Special gas vent. A vent *listed* and *labeled* for use with *listed* Category II, III and IV appliances.

Type B vent. A vent *listed* and *labeled* for use with appliances with draft hoods and other Category I appliances that are *listed* for use with Type B vents.

Type BW vent. A vent *listed* and *labeled* for use with wall furnaces.

Type L vent. A vent *listed* and *labeled* for use with appliances that are *listed* for use with Type L or Type B vents.

VENT CONNECTOR. See "Connector."

VENT GASES. Products of combustion from appliances plus excess air plus dilution air in the vent connector, gas vent or chimney above the draft hood or draft regulator.

VENT PIPING.

Breather. *Piping* run from a pressure-regulating device to the outdoors, designed to provide a reference to atmospheric pressure. If the device incorporates an integral pressure relief mechanism, a breather vent can also serve as a relief vent.

Relief. *Piping* run from a pressure-regulating or pressure-limiting device to the outdoors, designed to provide for the safe venting of gas in the event of excessive pressure in the gas *piping* system.

VENTED APPLIANCE CATEGORIES. Appliances that are categorized for the purpose of vent selection are classified into the following four categories:

Category I. An *appliance* that operates with a nonpositive vent static pressure and with a vent gas temperature that avoids excessive condensate production in the vent.

Category II. An *appliance* that operates with a nonpositive vent static pressure and with a vent gas temperature that is capable of causing excessive condensate production in the vent.

Category III. An *appliance* that operates with a positive vent static pressure and with a vent gas temperature that avoids excessive condensate production in the vent.

Category IV. An *appliance* that operates with a positive vent static pressure and with a vent gas temperature that is capable of causing excessive condensate production in the vent.

VENTED ROOM HEATER. A vented self-contained, free-standing, nonrecessed *appliance* for furnishing warm air to the space in which it is installed, directly from the heater without duct connections.

VENTED WALL FURNACE. A self-contained vented *appliance* complete with grilles or equivalent, designed for incorporation in or permanent attachment to the structure of a building, mobile home or travel trailer, and furnishing heated air circulated by gravity or by a fan directly into the space to be heated through openings in the casing. This definition shall exclude floor furnaces, unit heaters and central furnaces as herein defined.

VENTING SYSTEM. A continuous open passageway from the flue collar or draft hood of an *appliance* to the outdoor atmosphere for the purpose of removing flue or vent gases. A venting system is usually composed of a vent or a chimney and vent connector, if used, assembled to form the open passageway.

Forced-draft venting system. A portion of a venting system using a fan or other mechanical means to cause the removal of flue or vent gases under positive static vent pressure.

Induced draft venting system. A portion of a venting system using a fan or other mechanical means to cause the removal of flue or vent gases under nonpositive static vent pressure.

Mechanical draft venting system. A venting system designed to remove flue or vent gases by mechanical means, that consists of an induced draft portion under nonpositive static pressure or a forced draft portion under positive static pressure.

Natural draft venting system. A venting system designed to remove flue or vent gases under nonpositive static vent pressure entirely by natural draft.

WALL HEATER, UNVENTED-TYPE. A room heater of the type designed for insertion in or attachment to a wall or partition. Such heater does not incorporate concealed venting arrangements in its construction and discharges all products of combustion through the front into the room being heated.

[S][M] WATER HEATER. Any heating *appliance* or *equipment* that heats potable water and supplies such water to the potable hot water distribution system, and includes only those appliances that do not exceed pressure of 160 pounds per square inch (1103 kPa), volume of 120 gallons (454 L) and a heat input of 200,000 Btu/hr (58.6 kw). *Appliances* and *equipment* that exceed these values are classified as *boilers.*

CHAPTER 3

GENERAL REGULATIONS

User note:

About this chapter: *Chapter 3 addresses many unrelated topics that would be out of place in other chapters that address specific subjects. Topics include listing and labeling, structural safety, appliance locations, access, combustion air, installation requirements, clearances, electrical bonding and condensate disposal.*

SECTION 301 (IFGC)
GENERAL

[S] 301.1 Scope. This chapter shall govern the approval and installation of all *equipment* and appliances that comprise parts of the installations regulated by this code in accordance with Section ((~~101.2~~)) 103.1. See also the *International Fire Code*.

[S] 301.1.1 Other fuels. The requirements for combustion and dilution air for gas-fired appliances shall be governed by Section 304. The requirements for combustion and dilution air for appliances operating with fuels other than fuel gas shall be regulated by the *International Mechanical Code*. The standards for liquefied petroleum gas installations shall be the 2011 Edition of NFPA 58 (*Liquefied Petroleum Gas Code*) and the 2012 Edition of ANSI Z223.1/NFPA 54 (*National Fuel Gas Code*).

301.2 Energy utilization. Heating, ventilating and air-conditioning systems of all structures shall be designed and installed for efficient utilization of energy in accordance with the *International Energy Conservation Code*.

Note: Seattle Energy Code Section C403.1.4 also restricts the use of electric resistance and fossil fuel-fired equipment for HVAC heating in most buildings, and Section C404.2.3 restricts the use of electric resistance and fossil fuel-fired service water heating equipment in Group R-1 and R-2 buildings.

301.3 Listed and labeled. Appliances regulated by this code shall be *listed* and *labeled* for the application in which they are used unless otherwise *approved* in accordance with Section 105. The approval of unlisted appliances in accordance with Section 105 shall be based on *approved* engineering evaluation.

301.4 Labeling. Labeling shall be in accordance with the procedures set forth in Sections 301.4.1 through 301.4.2.3.

301.4.1 Testing. An *approved* agency shall test a representative sample of the appliances being *labeled* to the relevant standard or standards. The *approved* agency shall maintain a record of all of the tests performed. The record shall provide sufficient detail to verify compliance with the test standard.

301.4.2 Inspection and identification. The *approved* agency shall periodically perform an inspection, which shall be in-plant if necessary, of the appliances to be *labeled*. The inspection shall verify that the *labeled* appliances are representative of the appliances tested.

301.4.2.1 Independent. The agency to be *approved* shall be objective and competent. To confirm its objectivity, the agency shall disclose all possible conflicts of interest.

301.4.2.2 Equipment. An *approved* agency shall have adequate *equipment* to perform all required tests. The *equipment* shall be periodically calibrated.

301.4.2.3 Personnel. An *approved* agency shall employ experienced personnel educated in conducting, supervising and evaluating tests.

301.5 Label information. A permanent factory-applied nameplate(s) shall be affixed to appliances on which shall appear in legible lettering, the manufacturer's name or trademark, the model number, serial number and, for *listed* appliances, the seal or mark of the testing agency. A label shall include the hourly rating in British thermal units per hour (Btu/h) (W); the type of fuel *approved* for use with the *appliance*; and the minimum *clearance* requirements.

[S] 301.6 Plumbing connections. Potable water supply and building drainage system connections to appliances regulated by this code shall be in accordance with the ((~~*International*~~)) *Uniform Plumbing Code*.

301.7 Fuel types. Appliances shall be designed for use with the type of fuel gas that will be supplied to them.

301.7.1 Appliance fuel conversion. Appliances shall not be converted to utilize a different fuel gas except where complete instructions for such conversion are provided in the installation instructions, by the serving gas supplier or by the *appliance* manufacturer.

301.8 Vibration isolation. Where means for isolation of vibration of an *appliance* is installed, an *approved* means for support and restraint of that *appliance* shall be provided.

[BS] 302.6 Cutting, notching and boring holes in cold-formed steel framing. Flanges and lips of load-bearing, cold-formed steel framing members shall not be cut or notched. Holes in webs of load-bearing, cold-formed steel framing members shall be permitted along the centerline of the web of the framing member and shall not exceed the dimensional limitations, penetration spacing or minimum hole edge distance as prescribed by the registered design professional. Cutting, notching and boring holes of steel floor/roof decking shall be as prescribed by the registered design professional.

[BS] 302.7 Cutting, notching and boring holes in nonstructural cold-formed steel wall framing. Flanges and lips of nonstructural cold-formed steel wall studs shall be permitted along the centerline of the web of the framing member, shall not exceed 1-1/2 inches (38 mm) in width or 4 inches (102 mm) in length, and the holes shall not be spaced less than 24 inches (610 mm) center to center from another hole or less than 10 inches (254 mm) from the bearing end.

SECTION 303 (IFGC)
APPLIANCE LOCATION

303.1 General. Appliances shall be located as required by this section, specific requirements elsewhere in this code and the conditions of the *equipment* and *appliance* listing.

303.2 Hazardous locations. Appliances shall not be located in a *hazardous location* unless *listed* and *approved* for the specific installation.

303.3 Prohibited locations. Appliances shall not be located in sleeping rooms, bathrooms, toilet rooms, storage closets or surgical rooms, or in a space that opens only into such rooms or spaces, except where the installation complies with one of the following:

1. The *appliance* is a direct-vent *appliance* installed in accordance with the conditions of the listing and the manufacturer's instructions.
2. Vented room heaters, wall furnaces, vented decorative appliances, vented gas fireplaces, vented gas fireplace heaters and decorative appliances for installation in vented solid fuel-burning fireplaces are installed in rooms that meet the required volume criteria of Section 304.5.
3. A single wall-mounted unvented room heater is installed in a bathroom and such unvented room heater is equipped as specified in Section 621.6 and has an input rating not greater than 6,000 Btu/h (1.76 kW). The bathroom shall meet the required volume criteria of Section 304.5.
4. A single wall-mounted unvented room heater is installed in a bedroom and such unvented room heater is equipped as specified in Section 621.6 and has an input rating not greater than 10,000 Btu/h (2.93 kW). The bedroom shall meet the required volume criteria of Section 304.5.
5. The *appliance* is installed in a room or space that opens only into a bedroom or bathroom, and such room or space is used for no other purpose and is provided with a solid weather-stripped door equipped with an *approved* self-closing device. *Combustion air* shall be taken directly from the outdoors in accordance with Section 304.6.
6. A clothes dryer is installed in a residential bathroom or toilet room having a permanent opening with an area of not less than 100 square inches (0.06 m^2) that communicates with a space outside of a sleeping room, bathroom, toilet room or storage closet.

303.3.1 Fireplaces and decorative appliances in Group I-2, Condition 2 occupancies. Gas fireplace appliances and decorative gas appliances shall be prohibited in Group I-2, Condition 2 occupancies except where such appliances are direct-vent appliances installed in public lobby and waiting areas that are not within smoke compartments containing patient sleeping areas. The appliance controls shall be located where they can be accessed only by facility staff. Such fireplaces shall comply with Sections 501.2 and 604.1 and Section 915 of the *International Fire Code*.

303.4 Protection from vehicle impact damage. Appliances shall not be installed in a location subject to vehicle impact damage except where protected by an *approved* means.

303.5 Indoor locations. Furnaces and boilers installed in closets and alcoves shall be *listed* for such installation.

303.6 Outdoor locations. Appliances installed in outdoor locations shall be either *listed* for outdoor installation or provided with protection from outdoor environmental factors that influence the operability, durability and safety of the appliances.

[S] 303.7 Pit locations. Appliances installed in pits or excavations shall not come in direct contact with the surrounding soil. The sides of the pit or excavation shall be held back not less than 12 inches (305 mm) from the *appliance*, and a minimum of 30 inches (762 mm) on the control side. Where the depth exceeds 12 inches (305 mm) below adjoining grade, the walls of the pit or excavation shall be lined with concrete or masonry, such concrete or masonry shall extend not less than 4 inches (102 mm) above adjoining grade and shall have sufficient lateral load-bearing capacity to resist collapse. The *appliance* shall be protected from flooding in an *approved* manner.

[S][B] 303.8 Installation of pipes or ducts conveying gases, vapors or liquids in hoistways, machine rooms or machinery spaces. Pipes and ducts conveying gases, vapors or liquids are not permitted to be installed in elevator hoistways, elevator machine rooms and elevator machinery spaces.

Exceptions:

1. Only ducts for heating, cooling, ventilating and venting these spaces are permitted to be installed in the hoistway, machine room and machinery space.
2. Ducts and electrical conduit may pass through an elevator machine room or machinery space provided they are separate from the room or space by construction equal to the rated construction of the room or space and located so that all required clearances are maintained.

   If a vented machine room is not vented directly to the outside of the building, the *vent* shall be enclosed within a fire barrier with at least a one-hour fire-resistance rating, or as required for *shafts* where it passes through occupied floors.
3. Subject to the approval of the *code official*, pipes protected with double containment and pipes with threaded or welded joints may be permitted. Pipes shall not be located less than 7 feet (2134 mm) above the floor in machine rooms.

[S][B] 303.9 Interior exit stairways and exit passageways. Mechanical systems shall not be located in interior exit stairways and exit passageways. Penetrations passing entirely through both protective membranes are prohibited.

SECTION 304 (IFGS)
COMBUSTION, VENTILATION AND DILUTION AIR

304.1 General. Air for combustion, ventilation and dilution of flue gases for appliances installed in buildings shall be provided by application of one of the methods prescribed in Sections 304.5 through 304.9. Where the requirements of Section 304.5 are not met, outdoor air shall be introduced in accordance with one of the methods prescribed in Sections 304.6 through 304.9. *Direct-vent appliances*, gas appliances of other than natural draft design, vented gas appliances not designated as Category I and appliances equipped with power burners shall be provided with combustion, ventilation and dilution air in accordance with the *appliance* manufacturer's instructions.

Exception: Type 1 clothes dryers that are provided with makeup air in accordance with Section 614.6.

304.2 Appliance location. Appliances shall be located so as not to interfere with proper circulation of combustion, ventilation and dilution air.

304.3 Draft hood/regulator location. Where used, a draft hood or a barometric draft regulator shall be installed in the same room or enclosure as the *appliance* served to prevent any difference in pressure between the hood or regulator and the *combustion air* supply.

304.4 Makeup air provisions. Where exhaust fans, clothes dryers and kitchen ventilation systems interfere with the operation of appliances, makeup air shall be provided.

304.5 Indoor combustion air. The required volume of indoor air shall be determined in accordance with Section 304.5.1 or 304.5.2, except that where the air infiltration rate is known to be less than 0.40 air changes per hour (ACH), Section 304.5.2 shall be used. The total required volume shall be the sum of the required volume calculated for all appliances located within the space. Rooms communicating directly with the space in which the appliances are installed through openings not furnished with doors, and through *combustion air* openings sized and located in accordance with Section 304.5.3, are considered to be part of the required volume.

304.5.1 Standard method. The minimum required volume shall be 50 cubic feet per 1,000 Btu/h (4.8 m^3/kW) of the *appliance* input rating.

304.5.2 Known air-infiltration-rate method. Where the air infiltration rate of a structure is known, the minimum required volume shall be determined as follows:

For appliances other than fan-assisted, calculate volume using Equation 3-1.

$$Required\ Volume_{other} \geq \frac{21\ \text{ft}^3}{ACH}\left(\frac{I_{other}}{1{,}000\ \text{Btu/h}}\right)$$

(Equation 3-1)

For fan-assisted appliances, calculate volume using Equation 3-2.

$$Required\ Volume_{fan} \geq \frac{15\ \text{ft}^3}{ACH}\left(\frac{I_{fan}}{1{,}000\ \text{Btu/h}}\right)$$

(Equation 3-2)

where:

I_{other} = All appliances other than fan assisted (input in Btu/h).

I_{fan} = Fan-assisted *appliance* (input in Btu/h).

ACH = Air change per hour (percent of volume of space exchanged per hour, expressed as a decimal).

SECTION 306 (IFGC)
ACCESS AND SERVICE SPACE

[M] 306.1 Access for maintenance and replacement. Appliances, control devices, heat exchangers and HVAC components that utilize energy shall be accessible for inspection, service, repair and replacement without disabling the function of a fire-resistance-rated assembly or removing permanent construction, other appliances, or any other *piping* or ducts not connected to the *appliance* being inspected, serviced, repaired or replaced. A level working space not less than 30 inches (762 mm) deep and 30 inches (762 mm) wide shall be provided in front of the control side to service an *appliance*.

[M] 306.2 Appliances in rooms. Rooms containing appliances shall be provided with a door and an unobstructed passageway measuring not less than 36 inches (914 mm) wide and 80 inches (2032 mm) high.

Exception: Within a *dwelling unit*, appliances installed in a compartment, alcove, basement or similar space shall be provided with *access* by an opening or door and an unobstructed passageway measuring not less than 24 inches (610 mm) wide and large enough to allow removal of the largest *appliance* in the space, provided that a level service space of not less than 30 inches (762 mm) deep and the height of the *appliance*, but not less than 30 inches (762 mm), is present at the front or service side of the *appliance* with the door open.

[M] 306.3 Appliances in attics. Attics containing appliances shall be provided with an opening and unobstructed passageway large enough to allow removal of the largest *appliance*. The passageway shall be not less than 30 inches (762 mm) high and 22 inches (559 mm) wide and not more than 20 feet (6096 mm) in length measured along the centerline of the passageway from the opening to the *appliance*. The passageway shall have continuous solid flooring not less than 24 inches (610 mm) wide. A level service space not less than 30 inches (762 mm) deep and 30 inches (762 mm) wide shall be present at the front or service side of the *appliance*. The clear *access* opening dimensions shall be not less than 20 inches by 30 inches (508 mm by 762 mm) and large enough to allow removal of the largest *appliance*.

Exceptions:

1. The passageway and level service space are not required where the *appliance* is capable of being serviced and removed through the required opening.
2. Where the passageway is not less than 6 feet (1829 mm) high for its entire length, the passageway shall be not greater than 50 feet (15 250 mm) in length.

[S][M] 306.3.1 Electrical requirements. A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be provided at or near the *appliance* location in accordance with ((~~NFPA 70~~)) the *Seattle Electrical Code*.

[M] 306.4 Appliances under floors. Under-floor spaces containing appliances shall be provided with an *access* opening and unobstructed passageway large enough to remove the largest *appliance*. The passageway shall be not less than 30 inches (762 mm) high and 22 inches (559 mm) wide, nor more than 20 feet (6096 mm) in length measured along the centerline of the passageway from the opening to the *appliance*. A level service space not less than 30 inches (762 mm) deep and 30 inches (762 mm) wide shall be present at the front or service side of the *appliance*. If the depth of the passageway or the service space exceeds 12 inches (305 mm) below the adjoining grade, the walls of the passageway shall be lined with concrete or masonry extending 4 inches (102 mm) above the adjoining grade and having sufficient lateral-bearing capacity to resist collapse. The clear *access* opening dimensions shall be not less than 22 inches by 30 inches (559 mm by 762 mm), and large enough to allow removal of the largest *appliance*.

Exceptions:

1. The passageway is not required where the level service space is present when the *access* is open and the *appliance* is capable of being serviced and removed through the required opening.
2. Where the passageway is not less than 6 feet high (1829 mm) for its entire length, the passageway shall not be limited in length.

[S][M] 306.4.1 Electrical requirements. A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be provided at or near the *appliance* location in accordance with ((~~NFPA 70~~)) the *Seattle Electrical Code*.

[S][M] 306.5 Equipment and appliances on roofs or elevated structures. Where equipment or *appliances* requiring access ((~~or appliances~~)) are located on an elevated structure or the roof of a building such that personnel will have to climb higher than 16 feet (4877 mm) above grade to access such equipment or appliances, an interior or exterior means of access shall be provided. Such access shall not require climbing over obstructions greater than 30 inches (762 mm) in height or walking on roofs having a slope greater than 4 units vertical in 12 units horizontal (33-percent slope). Such access shall not require the use of portable ladders.

Permanent ladders installed to provide the required *access* shall comply with the following minimum design criteria:

1. The side railing shall extend above the parapet or roof edge not less than ((~~30~~)) 42 inches (((~~762~~)) 1067 mm).
2. Ladders shall have rung spacing not to exceed ((~~14~~)) 12 inches (((~~356~~)) 305 mm) on center. The upper-most rung shall be not more than 24 inches (610 mm) below the upper edge of the roof hatch, roof or parapet, as applicable.

3. Ladders shall have a toe spacing not less than ((~~6~~)) 7 inches (((~~152~~)) 178 mm) deep.
4. There shall be not less than 18 inches (457 mm) between rails.
5. Rungs shall have a diameter not less than 0.75-inch (19 mm) and be capable of withstanding a 300-pound (136.1 kg) load.
6. Ladders over 30 feet (9144 mm) in height shall be provided with offset sections and landings capable of withstanding 100 pounds per square foot (488.2 kg/m^2). Landing dimensions shall be not less than 18 inches (457 mm) and not less than the width of the ladder served. A guard rail shall be provided on all open sides of the landing.
7. Climbing clearance. The distance from the centerline of the rungs to the nearest permanent object on the climbing side of the ladder shall be not less than 30 inches (762 mm) measured perpendicular to the rungs. This distance shall be maintained from the point of ladder access to the bottom of the roof hatch. A minimum clear width of 15 inches (381 mm) shall be provided on both sides of the ladder measured from the midpoint of and parallel with the rungs, except where cages or wells are installed.
8. Landing required. The ladder shall be provided with a clear and unobstructed bottom landing area having a minimum dimension of 30 inches by 30 inches (762 mm by 762 mm) centered in front of the ladder.
9. Ladders shall be protected against corrosion by *approved* means.
10. Access to ladders shall be provided at all times.

Interpretation: Item 10 allows access to ladders to be restricted to authorized personnel, and prohibits storage that blocks or restricts access to the ladder.

Catwalks installed to provide the required *access* shall be not less than 24 inches (610 mm) wide and shall have railings as required for service platforms.

Exception: This section shall not apply to Group R-3 occupancies.

[M] 306.5.1 Sloped roofs. Where appliances, *equipment*, fans or other components that require service are installed on a roof having a slope of 3 units vertical in 12 units horizontal (25-percent slope) or greater and having an edge more than 30 inches (762 mm) above grade at such edge, a level platform shall be provided on each side of the *appliance* or *equipment* to which *access* is required for service, repair or maintenance. The platform shall be not less than 30 inches (762 mm) in any dimension and shall be provided with guards. The guards shall extend not less than 42 inches (1067 mm) above the platform, shall be constructed so as to prevent the passage of a 21-inch-diameter (533 mm) sphere and shall comply with the loading requirements for guards specified in the *International Building Code*. *Access* shall not require walking on roofs having a slope greater than 4 units vertical in 12 units horizontal (33-percent slope). Where *access* involves obstructions greater than 30 inches (762 mm) in height, such obstructions shall be provided with ladders installed in accordance with Section 306.5 or stairways installed in accordance with the requirements specified in the *International Building Code* in the path of travel to and from appliances, fans or *equipment* requiring service.

[S][M] 306.5.2 Electrical requirements. A receptacle outlet shall be provided at or near the *appliance* location in accordance with ((~~NFPA 70~~)) the *Seattle Electrical Code*.

[M] 306.6 Guards. Guards shall be provided where various components that require service and roof hatch openings are located within 10 feet (3048 mm) of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches (762 mm) above the floor, roof, or grade below. The guard shall extend not less than 30 inches (762 mm) beyond each end of components that require service. The top of the guard shall be located not less than 42 inches (1067 mm) above the elevated surface adjacent to the guard. The guard shall be constructed so as to prevent the passage of a 21-inch-diameter (533 mm) sphere and shall comply with the loading requirements for guards specified in the *International Building Code*.

Exception: Guards are not required where permanent fall arrest/restraint anchorage connector devices that comply with ANSI/ASSE Z 359.1 are affixed for use during the entire lifetime of the roof covering. The devices shall be reevaluated for possible replacement when the entire roof covering is replaced. The devices shall be placed not more than 10 feet (3048 mm) on center along hip and ridge lines and placed not less than 10 feet (3048 mm) from roof edges and the open sides of walking surfaces.

SECTION 307 (IFGC)
CONDENSATE DISPOSAL

307.1 Evaporators and cooling coils. Condensate drainage systems shall be provided for *equipment* and appliances containing evaporators and cooling coils in accordance with the *International Mechanical Code*.

[S] 307.2 Fuel-burning appliances. Liquid combustion by-products of condensing appliances shall be collected, pH-neutralized and discharged to an *approved* plumbing fixture or disposal area in accordance with the manufacturer's instructions. Condensate *piping* shall be of *approved* corrosion-resistant material and shall be not smaller than the drain connection on the *appliance*.

Such *piping* shall maintain a minimum slope in the direction of discharge of not less than one-eighth unit vertical in 12 units horizontal (1-percent slope).

[S][M] 307.3 Drain pipe materials and sizes. Components of the condensate disposal system shall be cast iron, galvanized steel, copper, cross-linked polyethylene, polyethylene, ABS, CPVC PVC or polypropylene pipe or tubing. Components shall be selected for the pressure and temperature rating of the installation. Joints and connections shall be made in accordance with the applicable provisions of Chapter 7 of the ((~~*International*~~)) *Uniform Plumbing Code* relative to the material type. Condensate waste and drain line size shall be not less than 3/4-inch (19 mm) internal diameter and shall not decrease in size from the drain pan connection to the place of condensate disposal. Where the drain pipes from more than one unit are manifolded together for condensate drainage, the pipe or tubing shall be sized in accordance with an *approved* method.

307.4 Traps. Condensate drains shall be trapped as required by the *equipment* or *appliance* manufacturer.

307.5 Auxiliary drain pan. Category IV condensing appliances shall be provided with an auxiliary drain pan where damage to any building component will occur as a result of stoppage in the condensate drainage system. Such pan shall be installed in accordance with the applicable provisions of Section 307 of the *International Mechanical Code.*

Exception: An auxiliary drain pan shall not be required for appliances that automatically shut down operation in the event of a stoppage in the condensate drainage system.

307.6 Condensate pumps. Condensate pumps located in uninhabitable spaces, such as attics and crawl spaces, shall be connected to the *appliance* or *equipment* served such that when the pump fails, the *appliance* or *equipment* will be prevented from operating. Pumps shall be installed in accordance with the manufacturer's instructions.

SECTION 308 (IFGS)
CLEARANCE REDUCTION

308.1 Scope. This section shall govern the reduction in required clearances to *combustible materials*, including gypsum board, and *combustible assemblies* for chimneys, vents, appliances, devices and equipment. Clearance requirements for air-conditioning equipment and central heating boilers and furnaces shall comply with Sections 308.3 and 308.4.

308.2 Reduction table. The allowable *clearance* reduction shall be based on one of the methods specified in Table 308.2 or shall utilize a reduced *clearance* protective assembly *listed* and *labeled* in accordance with UL 1618. Where required clearances are not listed in Table 308.2, the reduced clearances shall be determined by linear interpolation between the distances listed in the table. Reduced clearances shall not be derived by extrapolation below the range of the table. The reduction of the required clearances to combustibles for *listed* and *labeled* appliances and *equipment* shall be in accordance with the requirements of this section, except that such clearances shall not be reduced where reduction is specifically prohibited by the terms of the *appliance* or *equipment* listing [see Figures 308.2(1) through 308.2(3)].

308.3.2 Clearance reduction. Air-conditioning appliances shall be permitted to be installed with reduced clearances to *combustible material*, provided that the *combustible material* or *appliance* is protected as described in Table 308.2 and such reduction is allowed by the manufacturer's instructions.

308.3.3 Plenum clearances. Where the *furnace plenum* is adjacent to plaster on metal lath or *noncombustible material* attached to *combustible material*, the *clearance* shall be measured to the surface of the plaster or other noncombustible finish where the *clearance* specified is 2 inches (51 mm) or less.

308.3.4 Clearance from supply ducts. Supply air ducts connecting to listed central heating furnaces shall have the same minimum clearance to combustibles as required for the furnace supply plenum for a distance of not less than 3 feet (914 mm) from the supply plenum. Clearance is not required beyond the 3-foot (914 mm) distance.

308.4 Central-heating boilers and furnaces. *Clearance* requirements for central-heating boilers and furnaces shall comply with Sections 308.4.1 through 308.4.5. The *clearance* to these appliances shall not interfere with *combustion air*; draft hood *clearance* and relief; and accessibility for servicing.

308.4.1 Appliance clearances. Central-heating furnaces and low-pressure boilers shall be installed with clearances in accordance with the manufacturer's instructions.

308.4.2 Clearance reduction. Central-heating furnaces and low-pressure boilers shall be permitted to be installed with reduced clearances to *combustible material* provided that the *combustible material* or *appliance* is protected as described in Table 308.2 and such reduction is allowed by the manufacturer's instructions.

308.4.3 Clearance for servicing appliances. Front *clearance* shall be sufficient for servicing the burner and the furnace or boiler.

308.4.4 Plenum clearances. Where the *furnace plenum* is adjacent to plaster on metal lath or *noncombustible material* attached to *combustible material*, the *clearance* shall be measured to the surface of the plaster or other noncombustible finish where the *clearance* specified is 2 inches (51 mm) or less.

308.4.5 Clearance from supply ducts. Supply air ducts connecting to listed central heating furnaces shall have the same minimum clearance to combustibles as required for the furnace supply plenum for a distance of not less than 3 feet (914 mm) from the supply plenum. Clearance is not required beyond the 3-foot (914 mm) distance.

SECTION 309 (IFGC)
ELECTRICAL

309.1 Grounding. Gas *piping* shall not be used as a grounding electrode.

[S] 309.2 Connections. Electrical connections between appliances and the building wiring, including the grounding of the appliances, shall conform to ((~~NFPA 70~~)) the *Seattle Electrical Code*.

SECTION 310 (IFGS)
ELECTRICAL BONDING

310.1 Pipe and tubing other than CSST. Each above-ground portion of a gas *piping* system other than corrugated stainless steel tubing (CSST) that is likely to become energized shall be electrically continuous and bonded to an effective ground-fault current path. Gas *piping* other than CSST shall be considered to be bonded where it is connected to an appliance that is connected to the *equipment* grounding conductor of the circuit that supplies that *appliance*.

310.2 CSST. This section applies to corrugated stainless steel tubing (CSST) that is not listed with an arc-resistant jacket or coating system in accordance with ANSI LC 1/CSA 6.26. CSST gas *piping* systems and piping systems containing one or more segments of CSST shall be electrically continuous and bonded to the electrical service grounding electrode system or, where provided, the lightning protection grounding electrode system.

310.2.1 Point of connection. The bonding jumper shall connect to a metallic pipe, pipe fitting or CSST fitting.

310.2.2 Size and material of jumper. The bonding jumper shall be not smaller than 6 AWG copper wire or equivalent.

310.2.3 Bonding jumper length. The length of the bonding jumper between the connection to a gas piping system and the connection to a grounding electrode system shall not exceed 75 feet (22 860 mm). Any additional grounding electrodes installed to meet this requirement shall be bonded to the electrical service grounding electrode system or, where provided, the lightning protection grounding electrode system.

310.2.4 Bonding connections. Bonding connections shall be in accordance with NFPA 70.

310.2.5 Connection devices. Devices used for making the bonding connections shall be listed for the application in accordance with UL 467.

310.3 Arc-resistant CSST. This section applies to corrugated stainless steel tubing (CSST) that is listed with an arc-resistant jacket or coating system in accordance with ANSI LC 1/CSA 6.26. The CSST shall be electrically continuous and bonded to an

403.5.2 Stainless steel. Stainless steel tubing shall comply with ASTM A268 or ASTM A269.

403.5.3 Copper and copper alloy tubing. Copper tubing shall comply with Standard Type K or L of ASTM B88 or ASTM B280.

Copper and copper alloy tubing shall not be used if the gas contains more than an average of 0.3 grains of hydrogen sulfide per 100 standard cubic feet of gas (0.7 milligrams per 100 liters).

403.5.4 Aluminum tubing. Aluminum-alloy tubing shall comply with ASTM B210 or ASTM B241. Aluminum-alloy tubing shall be coated to protect against external corrosion where it is in contact with masonry, plaster or insulation, or is subject to repeated wettings by such liquids as water, detergent or sewage.

Aluminum-alloy tubing shall not be used in exterior locations or underground.

403.5.5 Corrugated stainless steel tubing. Corrugated stainless steel tubing shall be *listed* in accordance with ANSI LC 1/CSA 6.26.

403.6 Plastic pipe, tubing and fittings. Polyethylene plastic pipe, tubing and fittings used to supply fuel gas shall conform to ASTM D2513. Such pipe shall be marked "Gas" and "ASTM D2513."

Polyamide pipe, tubing and fittings shall be identified and conform to ASTM F2945. Such pipe shall be marked "Gas" and "ASTM F2945."

Polyvinyl chloride (PVC) and chlorinated polyvinyl chloride (CPVC) plastic pipe, tubing and fittings shall not be used to supply fuel gas.

403.6.1 Anodeless risers. Plastic pipe, tubing and anodeless risers shall comply with the following:

1. Factory-assembled anodeless risers shall be recommended by the manufacturer for the gas used and shall be leak tested by the manufacturer in accordance with written procedures.
2. Service head adapters and field-assembled anodeless risers incorporating service head adapters shall be recommended by the manufacturer for the gas used, and shall be designed and certified to meet the requirements of Category I of ASTM D2513, and U.S. Department of Transportation, Code of Federal Regulations, Title 49, Part 192.281(e). The manufacturer shall provide the user with qualified installation instructions as prescribed by the U.S. Department of Transportation, Code of Federal Regulations, Title 49, Part 192.283(b).

403.6.2 LP-gas systems. The use of plastic pipe, tubing and fittings in undiluted liquefied petroleum gas *piping* systems shall be in accordance with NFPA 58.

403.6.3 Regulator vent piping. Plastic pipe and fittings used to connect regulator vents to remote vent terminations shall be PVC conforming to ANSI/UL 651. PVC vent *piping* shall not be installed indoors.

[S] 403.7 Workmanship and defects. Pipe, tubing and fittings shall be clear and free from cutting burrs and defects in structure or threading, and shall be thoroughly brushed, and chip and scale blown.

Defects in pipe, tubing and fittings shall not be repaired. Defective pipe, tubing and fittings shall be replaced. No gas *piping* shall be strained or pinched, and no *appliance* shall be supported by, or develop any strain or stress on, its supply *piping.*

403.8 Protective coating. Where in contact with material or atmosphere exerting a corrosive action, metallic *piping* and fittings coated with a corrosion-resistant material shall be used. External or internal coatings or linings used on *piping* or components shall not be considered as adding strength.

403.9 Metallic pipe threads. Metallic pipe and fitting threads shall be taper pipe threads and shall comply with ASME B1.20.1.

403.9.1 Damaged threads. Pipe with threads that are stripped, chipped, corroded or otherwise damaged shall not be used. Where a weld opens during the operation of cutting or threading, that portion of the pipe shall not be used.

403.9.2 Number of threads. Field threading of metallic pipe shall be in accordance with Table 403.9.2.

TABLE 403.9.2
SPECIFICATIONS FOR THREADING METALLIC PIPE

IRON PIPE SIZE (inches)	APPROXIMATE LENGTH OF THREADED PORTION (inches)	APPROXIMATE NUMBER OF THREADS TO BE CUT
1/2	3/4	10
3/4	3/4	10
1	7/8	10
1-1/4	1	11
1-1/2	1	11
2	1	11
2-1/2	1-1/2	12
3	1-1/2	12
4	1-5/8	13

For SI: 1 inch = 25.4 mm.

403.9.3 Thread joint compounds. Thread joint compounds shall be resistant to the action of liquefied petroleum gas or to any other chemical constituents of the gases to be conducted through the *piping*.

403.10 Metallic piping joints and fittings. The type of *piping* joint used shall be suitable for the pressure-temperature conditions and shall be selected giving consideration to joint tightness and mechanical strength under the service conditions. The joint shall be able to sustain the maximum end force caused by the internal pressure and any additional forces caused by temperature expansion or contraction, vibration, fatigue or the weight of the pipe and its contents.

403.10.1 Pipe joints. Schedule 40 and heavier pipe joints shall be threaded, flanged, brazed, welded or assembled with press-connect fittings listed in accordance with ANSI LC4/CSA 6.32. Pipe lighter than Schedule 40 shall be connected using press-connect fittings, flanges, brazing or welding. Where nonferrous pipe is brazed, the brazing materials shall have a melting point in excess of 1,000°F (538°C). Brazing alloys shall not contain more than 0.05-percent phosphorus.

[S] 403.10.1.1 Welding. All welding in the *piping system* shall be done in accordance with ASME Boiler and Pressure Vessel Code Section IX.

403.10.2 Copper tubing joints. Copper tubing joints shall be assembled with *approved* gas tubing fittings, shall be brazed with a material having a melting point in excess of 1,000°F (538°C) or assembled with press-connect fittings listed in accordance with ANSI LC-4/CSA 6.32. Brazing alloys shall not contain more than 0.05-percent phosphorus.

403.10.3 Stainless steel tubing joints. Stainless steel tubing joints shall be welded, assembled with *approved* tubing fittings, brazed with a material having a melting point in excess of 1,000°F (578°C), or assembled with press-connect fittings listed in accordance with ANSI LC4/CSA 6.32.

403.10.4 Flared joints. Flared joints shall be used only in systems constructed from nonferrous pipe and tubing where experience or tests have demonstrated that the joint is suitable for the conditions and where provisions are made in the design to prevent separation of the joints.

403.10.5 Metallic fittings. Metallic fittings shall comply with the following:

1. Threaded fittings in sizes larger than 4 inches (102 mm) shall not be used.
2. Fittings used with steel, stainless steel or wrought-iron pipe shall be steel, stainless steel, copper alloy, malleable iron or cast iron.
3. Fittings used with copper or copper alloy pipe shall be copper or copper alloy.
4. Fittings used with aluminum-alloy pipe shall be of aluminum alloy.
5. Cast-iron fittings:
   - 5.1. Flanges shall be permitted.
   - 5.2. Bushings shall not be used.
   - 5.3. Fittings shall not be used in systems containing flammable gas-air mixtures.
   - 5.4. Fittings in sizes 4 inches (102 mm) and larger shall not be used indoors except where *approved*.
   - 5.5. Fittings in sizes 6 inches (152 mm) and larger shall not be used except where *approved*.
6. Aluminum-alloy fittings. Threads shall not form the joint seal.
7. Zinc aluminum-alloy fittings. Fittings shall not be used in systems containing flammable gas-air mixtures.
8. Special fittings. Fittings such as couplings, proprietary-type joints, saddle tees, gland-type compression fittings and flared, flareless and compression-type tubing fittings shall be: used within the fitting manufacturer's pressure-temperature recommendations; used within the service conditions anticipated with respect to vibration, fatigue, thermal expansion and contraction; and shall be approved.
9. Where pipe fittings are drilled and tapped in the field, the operation shall be in accordance with all of the following:
   - 9.1. The operation shall be performed on systems having operating pressures of 5 psi (34.5 kPa) or less.
   - 9.2. The operation shall be performed by the gas supplier or the gas supplier's designated representative.
   - 9.3. The drilling and tapping operation shall be performed in accordance with written procedures prepared by the gas supplier.
   - 9.4. The fittings shall be located outdoors.
   - 9.5. The tapped fitting assembly shall be inspected and proven to be free of leakage.

403.11 Plastic pipe, joints and fittings. Plastic pipe, tubing and fittings shall be joined in accordance with the manufacturer's instructions. Such joint shall comply with the following:

1. The joint shall be designed and installed so that the longitudinal pull-out resistance of the joint will be greater than or equal to the tensile strength of the plastic *piping* material.

404.7.1 Piping through holes or notches. Where piping is installed through holes or notches in framing members and the piping is located less than 1-1/2 inches (38 mm) from the framing member face to which wall, ceiling or floor membranes will be attached, the pipe shall be protected by shield plates that cover the width of the pipe and the framing member and that extend not less than 4 inches (102 mm) to each side of the framing member. Where the framing member that the piping passes through is a bottom plate, bottom track, top plate or top track, the shield plates shall cover the framing member and extend not less than 4 inches (102 mm) above the bottom framing member and not less than 4 inches (102 mm) below the top framing member.

404.7.2 Piping installed in other locations. Where the piping is located within a framing member and is less than 1-1/2 inches (38 mm) from the framing member face to which wall, ceiling or floor membranes will be attached, the piping shall be protected by shield plates that cover the width and length of the piping. Where the piping is located outside of a framing member and is located less than 1-1/2 inches (38 mm) from the nearest edge of the face of the framing member to which the membrane will be attached, the piping shall be protected by shield plates that cover the width and length of the piping.

404.7.3 Shield plates. Shield plates shall be of steel material having a thickness of not less than 0.0575 inch (1.463 mm) (No. 16 gage).

404.8 Piping in solid floors. *Piping* in solid floors shall be laid in channels in the floor and covered in a manner that will allow *access* to the *piping* with a minimum amount of damage to the building. Where such *piping* is subject to exposure to excessive moisture or corrosive substances, the *piping* shall be protected in an *approved* manner. As an alternative to installation in channels, the *piping* shall be installed in a conduit of Schedule 40 steel, wrought iron, PVC or ABS pipe in accordance with Section 404.8.1 or 404.8.2.

404.8.1 Conduit with one end terminating outdoors. The conduit shall extend into an occupiable portion of the building and, at the point where the conduit terminates in the building, the space between the conduit and the gas *piping* shall be sealed to prevent the possible entrance of any gas leakage. The conduit shall extend not less than 2 inches (51 mm) beyond the point where the pipe emerges from the floor. If the end sealing is capable of withstanding the full pressure of the gas pipe, the conduit shall be designed for the same pressure as the pipe. Such conduit shall extend not less than 4 inches (102 mm) outside the building, shall be vented above grade to the outdoors and shall be installed so as to prevent the entrance of water and insects.

404.8.2 Conduit with both ends terminating indoors. Where the conduit originates and terminates within the same building, the conduit shall originate and terminate in an accessible portion of the building and shall not be sealed. The conduit shall extend not less than 2 inches (51 mm) beyond the point where the pipe emerges from the floor.

404.9 Above-ground outdoor piping. *Piping* installed outdoors shall be elevated not less than 3-1/2 inches (89 mm) above ground and where installed across roof surfaces, shall be elevated not less than 3-1/2 inches (89 mm) above the roof surface. *Piping* installed above ground, outdoors, and installed across the surface of roofs shall be securely supported and located where it will be protected from physical damage. Where passing through an outside wall, the *piping* shall be protected against corrosion by coating or wrapping with an inert material. Where *piping* is encased in a protective pipe sleeve, the annular space between the *piping* and the sleeve shall be sealed.

404.10 Isolation. Metallic *piping* and metallic tubing that conveys fuel gas from an LP-gas storage container shall be provided with an *approved* dielectric fitting to electrically isolate the underground portion of the pipe or tube from the above-ground portion that enters a building. Such dielectric fitting shall be installed above ground, outdoors.

404.11 Protection against corrosion. Steel pipe or tubing exposed to corrosive action, such as soil conditions or moisture, shall be protected in accordance with Sections 404.11.1 through 404.11.5.

404.11.1 Galvanizing. Zinc coating shall not be deemed adequate protection for underground gas *piping*.

404.11.2 Protection methods. Underground piping shall comply with one or more of the following:

1. The piping shall be made of corrosion-resistant material that is suitable for the environment in which it will be installed.
2. Pipe shall have a factory-applied, electrically-insulating coating. Fittings and joints between sections of coated pipe shall be coated in accordance with the coating manufacturer's instructions.
3. The piping shall have a cathodic protection system installed and the system shall be monitored and maintained in accordance with an *approved* program.

404.11.3 Dissimilar metals. Where dissimilar metals are joined underground, an insulating coupling or fitting shall be used.

404.11.4 Protection of risers. Steel risers connected to plastic piping shall be cathodically protected by means of a welded anode, except where such risers are anodeless risers.

404.11.5 Prohibited use. Uncoated threaded or socket-welded joints shall not be used in *piping* in contact with soil or where internal or external crevice corrosion is known to occur.

404.12 Minimum burial depth. Underground *piping* systems shall be installed a minimum depth of 12 inches (305 mm) below grade, except as provided for in Section 404.12.1.

404.20 Testing of piping. Before any system of *piping* is put in service or concealed, it shall be tested to ensure that it is gas tight. Testing, inspection and purging of *piping* systems shall comply with Section 406.

SECTION 405 (IFGS)
PIPING BENDS AND CHANGES IN DIRECTION

405.1 General. Changes in direction of pipe shall be permitted to be made by the use of fittings, factory bends or field bends.

405.2 Metallic pipe. Metallic pipe bends shall comply with the following:

1. Bends shall be made only with bending tools and procedures intended for that purpose.
2. Bends shall be smooth and free from buckling, cracks or other evidence of mechanical damage.
3. The longitudinal weld of the pipe shall be near the neutral axis of the bend.
4. Pipe shall not be bent through an arc of more than 90 degrees (1.6 rad).
5. The inside radius of a bend shall be not less than six times the outside diameter of the pipe.

405.3 Plastic pipe. Plastic pipe bends shall comply with the following:

1. The pipe shall not be damaged and the internal diameter of the pipe shall not be effectively reduced.
2. Joints shall not be located in pipe bends.
3. The radius of the inner curve of such bends shall be not less than 25 times the inside diameter of the pipe.
4. Where the *piping* manufacturer specifies the use of special bending tools or procedures, such tools or procedures shall be used.

405.4 Elbows. Factory-made welding elbows or transverse segments cut therefrom shall have an arc length measured along the crotch of not less than 1 inch (25 mm) in pipe sizes 2 inches (51 mm) and larger.

SECTION 406 (IFGS)
INSPECTION, TESTING AND PURGING

406.1 General. Prior to acceptance and initial operation, all *piping* installations shall be visually inspected and pressure tested to determine that the materials, design, fabrication and installation practices comply with the requirements of this code.

406.1.1 Inspections. Inspection shall consist of visual examination during or after manufacture, fabrication, assembly or pressure tests.

[S] 406.1.2 Repairs and additions. In the event repairs or additions are made after the pressure test, the affected *piping* shall be tested.

Minor repairs and additions, as determined by the *code official*, are not required to be pressure tested provided that the work is inspected and connections are tested with a noncorrosive leak-detecting fluid or other *approved* leak-detecting methods.

406.1.3 New branches. Where new branches are installed to new *appliance*s, only the newly installed branches shall be required to be pressure tested. Connections between the new *piping* and the existing *piping* shall be tested with a noncorrosive leak-detecting fluid or other *approved* leak-detecting methods.

406.1.4 Section testing. A *piping* system shall be permitted to be tested as a complete unit or in sections. A valve in a line shall not be used as a bulkhead between gas in one section of the *piping* system and test medium in an adjacent section, except where a double block and bleed valve system is installed. A valve shall not be subjected to the test pressure unless it can be determined that the valve, including the valve-closing mechanism, is designed to safely withstand the test pressure.

406.1.5 Regulators and valve assemblies. Regulator and valve assemblies fabricated independently of the *piping* system in which they are to be installed shall be permitted to be tested with inert gas or air at the time of fabrication.

406.1.6 Pipe clearing. Prior to testing, the interior of the pipe shall be cleared of all foreign material.

406.2 Test medium. The test medium shall be air, nitrogen, carbon dioxide or an inert gas. Oxygen shall not be used as a test medium.

406.3 Test preparation. Pipe joints, including welds, shall be left exposed for examination during the test.

Exception: Covered or concealed pipe end joints that have been previously tested in accordance with this code.

406.3.1 Expansion joints. Expansion joints shall be provided with temporary restraints, if required, for the additional thrust load under test.

406.3.2 Appliance and equipment isolation. *Appliance*s and *equipment* that are not to be included in the test shall be either disconnected from the *piping* or isolated by blanks, blind flanges or caps. Flanged joints at which blinds are inserted to blank off other *equipment* during the test shall not be required to be tested.

[F] TABLE 413.9.2.3
SEPARATION DISTANCE FOR ATMOSPHERIC VENTING OF CNG

EQUIPMENT OR FEATURE	MINIMUM SEPARATION (feet)
Buildings	25
Building openings	25
Lot lines	15
Public ways	15
Vehicles	25
CNG compressor and storage vessels	25
CNG dispensers	25

For SI: 1 foot = 304.8 mm.

[S][F] 413.9.2.4 Grounding and bonding. The structure or appurtenance used for supporting the cylinder shall be grounded in accordance with ((~~NFPA 70~~)) the *Seattle Electrical Code*. The cylinder valve shall be bonded prior to the commencement of venting operations.

[F] 413.9.2.5 Vent tube. A vent tube that will divert the gas flow to the atmosphere shall be installed on the cylinder prior to the commencement of the venting and purging operation. The vent tube shall be constructed of pipe or tubing materials *approved* for use with CNG in accordance with the *International Fire Code*.

The vent tube shall be capable of dispersing the gas not less than 10 feet (3048 mm) above grade level. The vent tube shall not be provided with a rain cap or other feature that would limit or obstruct the gas flow.

At the connection fitting of the vent tube and the CNG cylinder, a *listed* bidirectional detonation flame arrester shall be provided.

[F] 413.9.2.6 Signage. Approved NO SMOKING signs shall be posted within 10 feet (3048 mm) of the cylinder support structure or appurtenance. *Approved* CYLINDER SHALL BE BONDED signs shall be posted on the cylinder support structure or appurtenance.

SECTION 414 (IFGC)
SUPPLEMENTAL AND STANDBY GAS SUPPLY

414.1 Use of air or oxygen under pressure. Where air or oxygen under pressure is used in connection with the gas supply, effective means such as a backpressure regulator and relief valve shall be provided to prevent air or oxygen from passing back into the gas *piping*. Where oxygen is used, installation shall be in accordance with NFPA 51.

414.2 Interconnections for standby fuels. Where supplementary gas for standby use is connected downstream from a meter or a service regulator where a meter is not provided, a device to prevent backflow shall be installed. A three-way valve installed to admit the standby supply and at the same time shut off the regular supply shall be permitted to be used for this purpose.

SECTION 415 (IFGS)
PIPING SUPPORT INTERVALS

415.1 Interval of support. *Piping* shall be supported at intervals not exceeding the spacing specified in Table 415.1. Spacing of supports for CSST shall be in accordance with the CSST manufacturer's instructions.

TABLE 415.1
SUPPORT OF PIPING

STEEL PIPE, NOMINAL SIZE OF PIPE (inches)	SPACING OF SUPPORTS (feet)	NOMINAL SIZE OF TUBING (SMOOTH-WALL) (inch O.D.)	SPACING OF SUPPORTS (feet)
1/2	6	1/2	4
3/4 or 1	8	5/8 or 3/4	6
1-1/4 or larger (horizontal)	10	7/8 or 1 (horizontal)	8
1-1/4 or larger (vertical)	Every floor level	1 or larger (vertical)	Every floor level

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

SECTION 416 (IFGS)
OVERPRESSURE PROTECTION DEVICES

416.1 Where required. Where the serving gas supplier delivers gas at a pressure greater than 2 psi for piping systems serving appliances designed to operate at a gas pressure of 14 inches w.c. or less, overpressure protection devices shall be installed. Pip-

3. Forced draft systems and all portions of induced draft systems under positive pressure during operation shall be designed and installed so as to prevent leakage of flue or vent gases into a building.
4. Vent connectors serving appliances vented by natural draft shall not be connected to any portion of mechanical draft systems operating under positive pressure.
5. Where a mechanical draft system is employed, provisions shall be made to prevent the flow of gas to the main burners when the draft system is not performing so as to satisfy the operating requirements of the *appliance* for safe performance.
6. The exit terminals of mechanical draft systems shall be not less than 7 feet (2134 mm) above finished ground level where located adjacent to public walkways, or less than 10 feet (3048 mm) from lot lines or adjacent buildings, and shall be located as specified in Section 503.8, Items 1 and 2.

503.3.4 Ventilating hoods and exhaust systems. Where automatically operated appliances, other than commercial cooking appliances, are vented through a ventilating hood or exhaust system equipped with a damper or with a power means of exhaust, provisions shall be made to allow the flow of gas to the main burners only when the damper is open to a position to properly vent the *appliance* and when the power means of exhaust is in operation.

503.3.5 Air ducts and furnace plenums. Venting systems shall not extend into or pass through any fabricated air duct or *furnace plenum.*

503.3.6 Above-ceiling air-handling spaces. Where a venting system passes through an above-ceiling air-handling space or other nonducted portion of an air-handling system, the venting system shall conform to one of the following requirements:

1. The venting system shall be a *listed* special gas vent; other venting system serving a Category III or Category IV *appliance;* or other positive pressure vent, with joints sealed in accordance with the *appliance* or vent manufacturer's instructions.
2. The venting system shall be installed such that fittings and joints between sections are not installed in the above-ceiling space.
3. The venting system shall be installed in a conduit or enclosure with sealed joints separating the interior of the conduit or enclosure from the ceiling space.

503.4 Type of venting system to be used. The type of venting system to be used shall be in accordance with Table 503.4.

TABLE 503.4
TYPE OF VENTING SYSTEM TO BE USED

APPLIANCES	TYPE OF VENTING SYSTEM
Listed Category I appliances Listed appliances equipped with draft hood Appliances listed for use with Type B gas vent	Type B gas vent (Section 503.6) Chimney (Section 503.5) Single-wall metal pipe (Section 503.7) Listed chimney lining system for gas venting (Section 503.5.3) Special gas vent listed for these appliances (Section 503.4.2)
Listed vented wall furnaces	Type B-W gas vent (Sections 503.6, 608)
Category II, Category III and Category IV appliances	As specified or furnished by manufacturers of listed appliances (Sections 503.4.1, 503.4.2)
Incinerators	In accordance with NFPA 82
Appliances that can be converted for use with solid fuel	Chimney (Section 503.5)
Unlisted combination gas and oil-burning appliances	Chimney (Section 503.5)
Listed combination gas and oil-burning appliances	Type L vent (Section 503.6) or chimney (Section 503.5)
Combination gas and solid fuel-burning appliances	Chimney (Section 503.5)
Appliances listed for use with chimneys only	Chimney (Section 503.5)
Unlisted appliances	Chimney (Section 503.5)
Decorative appliances in vented fireplaces	Chimney
Gas-fired toilets	Single-wall metal pipe (Section 626)
Direct-vent appliances	See Section 503.2.3
Appliances with integral vent	See Section 503.2.4

[S] 503.4.1 Plastic piping. Where plastic piping is used to vent an appliance, the appliance shall be listed for use with such venting materials and the appliance manufacturer's installation instructions shall identify the specific plastic piping material. The plastic pipe venting materials and sealants used to connect pipes and fittings in plastic exhausts shall be labeled in accordance with the product standards specified by the appliance manufacturer and shall be rated to meet or exceed the temperature ratings of the appliance exhaust or shall be listed and labeled in accordance with UL 1738.

[M] 614.8 Domestic clothes dryer exhaust ducts. Exhaust ducts for domestic clothes dryers shall conform to the requirements of Sections 614.8.1 through 614.8.6.

[M] 614.8.1 Material and size. Exhaust ducts shall have a smooth interior finish and shall be constructed of metal not less than 0.016 inch (0.4 mm) in thickness. The exhaust duct size shall be 4 inches (102 mm) nominal in diameter.

[M] 614.8.2 Duct installation. Exhaust ducts shall be supported at 4-foot (1219 mm) intervals and secured in place. The insert end of the duct shall extend into the adjoining duct or fitting in the direction of airflow. Ducts shall not be joined with screws or similar fasteners that protrude more than 1/8 inch (3.2 mm) into the inside of the duct. Where dryer exhaust ducts are enclosed in wall or ceiling cavities, such cavities shall allow the installation of the duct without deformation.

[M] 614.8.3 Transition ducts. Transition ducts used to connect the dryer to the exhaust duct system shall be a single length that is *listed* and *labeled* in accordance with UL 2158A. Transition ducts shall be not more than 8 feet (2438 mm) in length, and shall not be concealed within construction.

[M] 614.8.4 Duct length. The maximum allowable exhaust duct length shall be determined by one of the methods specified in Sections 614.8.4.1 through 614.8.4.3.

[M] 614.8.4.1 Specified length. The maximum length of the exhaust duct shall be 35 feet (10 668 mm) from the connection to the transition duct from the dryer to the outlet terminal. Where fittings are utilized, the maximum length of the exhaust duct shall be reduced in accordance with Table 614.8.4.1.

[M] TABLE 614.8.4.1
DRYER EXHAUST DUCT FITTING EQUIVALENT LENGTH

DRYER EXHAUST DUCT FITTING TYPE	EQUIVALENT LENGTH
4 inch radius mitered 45-degree elbow	2 feet, 6 inches
4 inch radius mitered 90-degree elbow	5 feet
6 inch radius smooth 45-degree elbow	1 foot
6 inch radius smooth 90-degree elbow	1 foot, 9 inches
8 inch radius smooth 45-degree elbow	1 foot
8 inch radius smooth 90-degree elbow	1 foot, 7 inches
10 inch radius smooth 45-degree elbow	9 inches
10 inch radius smooth 90-degree elbow	1 foot, 6 inches

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.01745 rad.

[S][M] 614.8.4.2 Manufacturer's instructions. The maximum length of the exhaust duct shall be determined by the dryer manufacturer's installation instructions. The code official shall be provided with a copy of the installation instructions for the make and model of the dryer. Where the exhaust duct is to be concealed, the installation instructions shall be provided to the code official prior to the concealment inspection. In the absence of fitting equivalent length calculations from the clothes dryer manufacturer, Table 614.8.4.1 shall be utilized.

Exception: The maximum length of the duct may be increased in an engineered exhaust system when a listed and labeled dryer exhaust booster fan is installed in accordance with the manufacturer's installation instructions.

[M] 614.8.4.3 Dryer exhaust duct power ventilator length. The maximum length of the exhaust duct shall be determined by the dryer exhaust duct power ventilator manufacturer's installation instructions.

[M] 614.8.5 Length identification. Where the exhaust duct equivalent length exceeds 35 feet (10 668 mm), the equivalent length of the exhaust duct shall be identified on a permanent label or tag. The label or tag shall be located within 6 feet (1829 mm) of the exhaust duct connection.

[M] 614.8.6 Exhaust duct required. Where space for a clothes dryer is provided, an exhaust duct system shall be installed.

Where the clothes dryer is not installed at the time of occupancy, the exhaust duct shall be capped at the location of the future dryer.

Exception: Where a *listed* condensing clothes dryer is installed prior to occupancy of the structure.

[M] 614.9 Commercial clothes dryers. The installation of dryer exhaust ducts serving Type 2 clothes dryers shall comply with the *appliance* manufacturer's instructions. Exhaust fan motors installed in exhaust systems shall be located outside of the airstream. In multiple installations, the fan shall operate continuously or be interlocked to operate when any individual unit is operating. Ducts shall have a minimum *clearance* of 6 inches (152 mm) to *combustible materials*.

[M] 614.10 Common exhaust systems for clothes dryers located in multistory structures. Where a common multistory duct system is designed and installed to convey exhaust from multiple clothes dryers, the construction of such system shall be in accordance with all of the following:

1. The shaft in which the duct is installed shall be constructed and fire-resistance rated as required by the *International Building Code*.

SECTION 616 (IFGC)
ENGINE AND GAS TURBINE-POWERED EQUIPMENT

616.1 Powered equipment. Permanently installed *equipment* powered by internal combustion engines and turbines shall be installed in accordance with the manufacturer's instructions and NFPA 37. Stationary engine generator assemblies shall meet the requirements of UL 2200.

616.2 Gas supply connection. *Equipment* powered by internal combustion engines and turbines shall not be rigidly connected to the gas supply *piping*.

SECTION 617 (IFGC)
POOL AND SPA HEATERS

617.1 General. Pool and spa heaters shall be tested in accordance with ANSI Z21.56/CSA 4.7 and shall be installed in accordance with the manufacturer's instructions.

[S] SECTION 618 (IFGC)
((~~FORCED-AIR WARM-AIR FURNACES~~))
AIR-HANDLING UNITS

618.1 General. Forced-air warm-air furnaces shall be tested in accordance with ANSI Z21.47/CSA 2.3 or UL 795 and shall be installed in accordance with the manufacturer's instructions.

618.2 Dampers. Volume dampers shall not be placed in the air inlet to a furnace in a manner that will reduce the required air to the furnace.

[S] 618.3 Prohibited sources. Outdoor or return air for forced-air heating and cooling systems shall not be taken from the following locations:

1. Closer than 10 feet (3048 mm) from an *appliance* vent outlet, a vent opening from a plumbing drainage system or the discharge outlet of an exhaust fan, unless the outlet is 3 feet (914 mm) above the outside air inlet.
2. Where there is the presence of objectionable odors, fumes or flammable vapors; or where located less than 10 feet (3048 mm) above the surface of any abutting public way or driveway; or where located at grade level by a sidewalk, street, alley or driveway.
3. A hazardous or insanitary location or a refrigeration machinery room as defined in the *International Mechanical Code*.
4. A room or space, the volume of which is less than 25 percent of the entire volume served by such system. Where connected by a permanent opening having an area sized in accordance with this code, adjoining rooms or spaces shall be considered to be a single room or space for the purpose of determining the volume of such rooms or spaces.

   Exception: The minimum volume requirement shall not apply where the amount of return air taken from a room or space is less than or equal to the amount of supply air delivered to such room or space.
5. A room or space containing an *appliance* where such a room or space serves as the sole source of return air.

   Exception: This shall not apply where:

   1. The *appliance* is a direct-vent *appliance* or an *appliance* not requiring a vent in accordance with Section 501.8.
   2. The room or space complies with the following requirements:

      2.1. The return air shall be taken from a room or space having a volume exceeding 1 cubic foot for each 10 Btu/h (9.6 L/W) of combined input rating of all fuel-burning appliances therein.

      2.2. The volume of supply air discharged back into the same space shall be approximately equal to the volume of return air taken from the space.

      2.3. Return-air inlets shall not be located within 10 feet (3048 mm) of a draft hood in the same room or space or the combustion chamber of any atmospheric burner *appliance* in the same room or space.
   3. Rooms or spaces containing solid fuel-burning appliances, provided that return-air inlets are located not less than 10 feet (3048 mm) from the firebox of such appliances.
6. A closet, bathroom, toilet room, kitchen, garage, boiler room, furnace room or unconditioned attic.

   Exceptions:

   1. Where return air intakes are located not less than 10 feet (3048 mm) from cooking appliances and serve only the kitchen area, taking return air from a kitchen area shall not be prohibited.
   2. Dedicated forced air systems serving only a garage shall not be prohibited from obtaining return air from the garage.

7. A crawl space. ((~~by means of direct connection to the return side of a forced-air system. Transfer openings in the crawl space enclosure shall not be prohibited.~~))

618.4 Screen. Required outdoor air inlets for residential portions of a building shall be covered with a screen having 1/4-inch (6.4 mm) openings. Required outdoor air inlets serving a nonresidential portion of a building shall be covered with screen having openings larger than 1/4 inch (6.4 mm) and not larger than 1 inch (25 mm).

618.5 Return-air limitation. Return air from one *dwelling unit* shall not be discharged into another *dwelling unit*.

618.6 (IFGS) Furnace plenums and air ducts. Where a furnace is installed so that supply ducts carry air circulated by the furnace to areas outside of the space containing the furnace, the return air shall be handled by a duct(s) sealed to the furnace casing and terminating outside of the space containing the furnace.

SECTION 619 (IFGC)
CONVERSION BURNERS

619.1 Conversion burners. The installation of conversion burners shall conform to ANSI Z21.8.

SECTION 620 (IFGC)
UNIT HEATERS

620.1 General. Unit heaters shall be tested in accordance with ANSI Z83.8/CSA 2.6 and shall be installed in accordance with the manufacturer's instructions.

620.2 Support. Suspended-type unit heaters shall be supported by elements that are designed and constructed to accommodate the weight and dynamic loads. Hangers and brackets shall be of *noncombustible material*.

620.3 Ductwork. Ducts shall not be connected to a unit heater unless the heater is *listed* for such installation.

620.4 Clearance. Suspended-type unit heaters shall be installed with clearances to *combustible materials* of not less than 18 inches (457 mm) at the sides, 12 inches (305 mm) at the bottom and 6 inches (152 mm) above the top where the unit heater has an internal draft hood or 1 inch (25 mm) above the top of the sloping side of the vertical draft hood.

Floor-mounted-type unit heaters shall be installed with clearances to *combustible materials* at the back and one side only of not less than 6 inches (152 mm). Where the flue gases are vented horizontally, the 6-inch (152 mm) *clearance* shall be measured from the draft hood or vent instead of the rear wall of the unit heater. Floor-mounted-type unit heaters shall not be installed on combustible floors unless *listed* for such installation.

Clearances for servicing all unit heaters shall be in accordance with the manufacturer's installation instructions.

Exception: Unit heaters *listed* for reduced *clearance* shall be permitted to be installed with such clearances in accordance with their listing and the manufacturer's instructions.

620.5 (IFGS) Installation in commercial garages and aircraft hangars. Unit heaters installed in garages for more than three motor vehicles or in aircraft hangars shall be installed in accordance with Sections 305.9, 305.10 and 305.11.

SECTION 621 (IFGC)
UNVENTED ROOM HEATERS

621.1 General. Unvented room heaters shall be tested in accordance with ANSI Z21.11.2 and shall be installed in accordance with the conditions of the listing and the manufacturer's instructions. Unvented room heaters utilizing fuels other than fuel gas shall be regulated by the *International Mechanical Code*.

621.2 Prohibited use. One or more unvented room heaters shall not be used as the sole source of comfort heating in a *dwelling unit*.

621.3 Input rating. Unvented room heaters shall not have an input rating in excess of 40,000 Btu/h (11.7 kW).

621.4 Prohibited locations. Unvented room heaters shall not be installed within occupancies in Groups A, E and I. The location of unvented room heaters shall comply with Section 303.3.

621.5 Room or space volume. The aggregate input rating of all unvented appliances installed in a room or space shall not exceed 20 Btu/h per cubic foot (207 W/m^3) of volume of such room or space. Where the room or space in which the appliances are installed is directly connected to another room or space by a doorway, archway or other opening of comparable size that cannot be closed, the volume of such adjacent room or space shall be permitted to be included in the calculations.

621.6 Oxygen-depletion safety system. Unvented room heaters shall be equipped with an oxygen-depletion-sensitive safety shutoff system. The system shall shut off the gas supply to the main and pilot burners when the oxygen in the surrounding atmosphere is depleted to the percent concentration specified by the manufacturer, but not lower than 18 percent. The system shall not incorporate field adjustment means capable of changing the set point at which the system acts to shut off the gas supply to the room heater.

621.7 Unvented decorative room heaters. An unvented decorative room heater shall not be installed in a factory-built *fireplace* unless the *fireplace* system has been specifically tested, *listed* and *labeled* for such use in accordance with UL 127.

621.7.1 Ventless firebox enclosures. Ventless firebox enclosures used with unvented decorative room heaters shall be *listed* as complying with ANSI Z21.91.

SECTION 622 (IFGC)
VENTED ROOM HEATERS

622.1 General. Vented room heaters shall be tested in accordance with ANSI Z21.86/CSA 2.32, shall be designed and equipped as specified in Section 602.2 and shall be installed in accordance with the manufacturer's instructions.

SECTION 623 (IFGC)
COOKING APPLIANCES

623.1 Cooking appliances. Cooking appliances that are designed for permanent installation, including ranges, ovens, stoves, broilers, grills, fryers, griddles, hot plates and barbecues, shall be tested in accordance with ANSI Z21.1, ANSI Z21.58/CSA 1.6 or ANSI Z83.11/CSA 1.8 and shall be installed in accordance with the manufacturer's instructions.

623.2 Prohibited location. Cooking appliances designed, tested, *listed* and *labeled* for use in commercial occupancies shall not be installed within dwelling units or within any area where domestic cooking operations occur.

Exceptions:

1. Appliances that are also listed as domestic cooking appliances.
2. Where the installation is designed by a licensed Professional Engineer, in compliance with the manufacturer's installation instructions.

623.3 Domestic appliances. Cooking appliances installed within dwelling units and within areas where domestic cooking operations occur shall be *listed* and *labeled* as household-type appliances for domestic use.

623.4 Domestic range installation. Domestic ranges installed on combustible floors shall be set on their own bases or legs and shall be installed with clearances of not less than that shown on the label.

623.5 Open-top broiler unit hoods. A ventilating hood shall be provided above a domestic open-top broiler unit, unless otherwise *listed* for forced down draft ventilation.

623.5.1 Clearances. A minimum *clearance* of 24 inches (610 mm) shall be maintained between the cooking top and *combustible material* above the hood. The hood shall be at least as wide as the open-top broiler unit and be centered over the unit.

623.6 Commercial cooking appliance venting. Commercial cooking appliances, other than those exempted by Section 501.8, shall be vented by connecting the *appliance* to a vent or chimney in accordance with this code and the *appliance* manufacturer's instructions or the *appliance* shall be vented in accordance with Section 505.1.1.

623.7 (IFGS) Vertical clearance above cooking top. Household cooking appliances shall have a vertical *clearance* above the cooking top of not less than 30 inches (760 mm) to *combustible material* and metal cabinets. A minimum *clearance* of 24 inches (610 mm) is permitted where one of the following is installed:

1. The underside of the *combustible material* or metal cabinet above the cooking top is protected with not less than 1/4-inch (6.4 mm) insulating millboard covered with sheet metal not less than 0.0122 inch (0.3 mm) thick.
2. A metal ventilating hood constructed of sheet metal not less than 0.0122 inch (0.3 mm) thick is installed above the cooking top with a *clearance* of not less than 1/4 inch (6.4 mm) between the hood and the underside of the *combustible material* or metal cabinet. The hood shall have a width not less than the width of the *appliance* and shall be centered over the *appliance.*
3. A *listed* cooking *appliance* or microwave oven is installed over a *listed* cooking *appliance* and in compliance with the terms of the manufacturer's installation instructions for the upper appliance.

SECTION 624 (IFGC)
WATER HEATERS

[S] 624.1 General. Water heaters shall be ((~~tested in accordance with ANSI Z21.10.1/CSA 4.1 and ANSI Z21.10.3/CSA 4.3 and shall be installed in accordance with the manufacturer's instructions~~)) installed in accordance with the *Uniform Plumbing Code* and *Seattle Electrical Code*. ((~~Water heaters utilizing fuels other than fuel gas shall be regulated by the *International Mechanical Code.*~~))

[S] ((~~624.1.1 Installation requirements.~~ ~~The requirements for water heaters relative to sizing, relief valves, drain pans and scald protection shall be in accordance with the *International Plumbing Code.*~~))

[S] ((~~624.2 Water heaters utilized for space heating.~~ ~~Water heaters utilized both to supply potable hot water and provide hot water for space-heating applications shall be *listed* and *labeled* for such applications by the manufacturer and shall be installed in accordance with the manufacturer's instructions and the *International Plumbing Code*.~~))

SECTION 625 (IFGC)
REFRIGERATORS

625.1 General. Refrigerators shall be tested in accordance with ANSI Z21.19/CSA 1.4 and shall be installed in accordance with the manufacturer's instructions.

Refrigerators shall be provided with adequate clearances for ventilation at the top and back, and shall be installed in accordance with the manufacturer's instructions. If such instructions are not available, not less than 2 inches (51 mm) shall be provided between the back of the refrigerator and the wall and not less than 12 inches (305 mm) above the top.

SECTION 626 (IFGC)
GAS-FIRED TOILETS

626.1 General. Gas-fired toilets shall be tested in accordance with ANSI Z21.61 and installed in accordance with the manufacturer's instructions.

626.2 Clearance. A gas-fired toilet shall be installed in accordance with its listing and the manufacturer's instructions, provided that the *clearance* shall in any case be sufficient to afford ready *access* for use, cleanout and necessary servicing.

SECTION 627 (IFGC)
AIR-CONDITIONING APPLIANCES

627.1 General. Gas-fired air-conditioning appliances shall be tested in accordance with ANSI Z21.40.1/CGA 2.91 or ANSI Z21.40.2/CGA 2.92 and shall be installed in accordance with the manufacturer's instructions.

627.2 Independent piping. Gas *piping* serving heating appliances shall be permitted to also serve cooling appliances where such heating and cooling appliances cannot be operated simultaneously (see Section 402).

627.3 Connection of gas engine-powered air conditioners. To protect against the effects of normal vibration in service, gas engines shall not be rigidly connected to the gas supply *piping*.

627.4 Clearances for indoor installation. Air-conditioning appliances installed in rooms other than alcoves and closets shall be installed with clearances not less than those specified in Section 308.3 except that air-conditioning appliances *listed* for installation at lesser clearances than those specified in Section 308.3 shall be permitted to be installed in accordance with such listing and the manufacturer's instructions and air-conditioning appliances *listed* for installation at greater clearances than those specified in Section 308.3 shall be installed in accordance with such listing and the manufacturer's instructions.

Air-conditioning appliances installed in rooms other than alcoves and closets shall be permitted to be installed with reduced clearances to *combustible material*, provided that the *combustible material* is protected in accordance with Table 308.2.

627.5 Alcove and closet installation. Air-conditioning appliances installed in spaces such as alcoves and closets shall be specifically *listed* for such installation and installed in accordance with the terms of such listing. The installation clearances for air-conditioning appliances in alcoves and closets shall not be reduced by the protection methods described in Table 308.2.

627.6 Installation. Air-conditioning appliances shall be installed in accordance with the manufacturer's instructions. Unless the *appliance* is *listed* for installation on a combustible surface such as a floor or roof, or unless the surface is protected in an *approved* manner, the *appliance* shall be installed on a surface of noncombustible construction with *noncombustible material* and surface finish, and *combustible material* shall not be against the underside thereof.

627.7 Plenums and air ducts. A plenum supplied as a part of the air-conditioning *appliance* shall be installed in accordance with the *appliance* manufacturer's instructions. Where a plenum is not supplied with the *appliance*, such plenum shall be installed in accordance with the fabrication and installation instructions provided by the plenum and *appliance* manufacturer. The method of connecting supply and return ducts shall facilitate proper circulation of air.

Where the air-conditioning *appliance* is installed within a space separated from the spaces served by the *appliance*, the air circulated by the *appliance* shall be conveyed by ducts that are sealed to the casing of the *appliance* and that separate the circulating air from the combustion and ventilation air.

627.8 Refrigeration coils. A refrigeration coil shall not be installed in conjunction with a forced-air furnace where circulation of cooled air is provided by the furnace blower, unless the blower has sufficient capacity to overcome the external static resistance imposed by the duct system and cooling coil at the air throughput necessary for heating or cooling, whichever is greater. Furnaces shall not be located upstream from cooling units, unless the cooling unit is designed or equipped so as not to develop excessive temperature or pressure. Refrigeration coils shall be installed in parallel with or on the downstream side of central furnaces to avoid condensation in the heating element, unless the furnace has been specifically *listed* for downstream installation.

With a parallel flow arrangement, the dampers or other means used to control flow of air shall be sufficiently tight to prevent any circulation of cooled air through the furnace.

Means shall be provided for disposal of condensate and to prevent dripping of condensate onto the heating element.

627.9 Cooling units used with heating boilers. Boilers, where used in conjunction with refrigeration systems, shall be installed so that the chilled medium is piped in parallel with the heating boiler with appropriate valves to prevent the chilled medium from entering the heating boiler. Where hot water heating boilers are connected to heating coils located in air-handling units where they might be exposed to refrigerated air circulation, such boiler *piping* systems shall be equipped with flow control valves or other automatic means to prevent gravity circulation of the boiler water during the cooling cycle.

627.10 Switches in electrical supply line. Means for interrupting the electrical supply to the air-conditioning *appliance* and to its associated cooling tower (if supplied and installed in a location remote from the air conditioner) shall be provided within sight of and not over 50 feet (15 240 mm) from the air conditioner and cooling tower.

SECTION 628 (IFGC)
ILLUMINATING APPLIANCES

628.1 General. Illuminating appliances shall be tested in accordance with ANSI Z21.42 and shall be installed in accordance with the manufacturer's instructions.

628.2 Mounting on buildings. Illuminating appliances designed for wall or ceiling mounting shall be securely attached to substantial structures in such a manner that they are not dependent on the gas *piping* for support.

628.3 Mounting on posts. Illuminating appliances designed for post mounting shall be securely and rigidly attached to a post. Posts shall be rigidly mounted. The strength and rigidity of posts greater than 3 feet (914 mm) in height shall be at least equivalent to that of a 2-1/2-inch-diameter (64 mm) post constructed of 0.064-inch-thick (1.6-mm) steel or a 1-inch (25.4 mm) Schedule 40 steel pipe. Posts 3 feet (914 mm) or less in height shall not be smaller than a 3/4-inch (19.1 mm) Schedule 40 steel pipe. Drain openings shall be provided near the base of posts where there is a possibility of water collecting inside them.

628.4 Appliance pressure regulators. Where an *appliance* pressure regulator is not supplied with an illuminating *appliance* and the service line is not equipped with a service pressure regulator, an *appliance* pressure regulator shall be installed in the line to the illuminating *appliance*. For multiple installations, one regulator of adequate capacity shall be permitted to serve more than one illuminating *appliance*.

SECTION 629 (IFGC)
SMALL CERAMIC KILNS

629.1 General. Kilns shall be installed in accordance with the manufacturer's instructions and the provisions of this code. Kilns shall comply with Section 301.3.

SECTION 630 (IFGC)
INFRARED RADIANT HEATERS

630.1 General. Infrared radiant heaters shall be tested in accordance with ANSI Z83.19 or Z83.20 and shall be installed in accordance with the manufacturer's instructions.

630.2 Support. Infrared radiant heaters shall be fixed in a position independent of gas and electric supply lines. Hangers and brackets shall be of *noncombustible material*.

630.3 (IFGS) Combustion and ventilation air. Where unvented infrared heaters are installed, natural or mechanical means shall provide outdoor ventilation air at a rate of not less than 4 cfm per 1,000 Btu/h (0.38 m^3/min/kW) of the aggregate input rating of all such heaters installed in the space. Exhaust openings for removing flue products shall be above the level of the heaters.

630.4 (IFGS) Installation in commercial garages and aircraft hangars. Overhead infrared heaters installed in garages for more than three motor vehicles or in aircraft hangars shall be installed in accordance with Sections 305.9, 305.10 and 305.11.

SECTION 631 (IFGC)
BOILERS

[S] 631.1 Standards. Boilers shall ((~~be *listed* in accordance with the requirements of ANSI Z21.13/CSA 4.9 or UL 795~~)) comply with the *Seattle Boiler and Pressure Vessel Code*. ((~~If applicable, the boiler shall be designed and constructed in accordance with the requirements of ASME CSD-1 and as applicable, the ASME *Boiler and Pressure Vessel Code*, Sections I, II, IV, V and IX and NFPA 85.~~))

[S] ((~~631.2 Installation.~~ ~~In addition to the requirements of this code, the installation of boilers shall be in accordance with the manufacturer's instructions and the *International Mechanical Code*. Operating instructions of a permanent type shall be attached~~

~~to the boiler. Boilers shall have all controls set, adjusted and tested by the installer. A complete control diagram together with complete boiler operating instructions shall be furnished by the installer. The manufacturer's rating data and the nameplate shall be attached to the boiler.~~))

[S] ((~~631.3 Clearance to *combustible materials*.~~ ~~Clearances to *combustible materials* shall be in accordance with Section 308.4.~~))

[S] SECTION 632 (IFGC)
((~~EQUIPMENT INSTALLED IN EXISTING UNLISTED BOILERS~~))
RESERVED

((~~632.1 General.~~ ~~Gas *equipment* installed in existing unlisted boilers shall comply with Section 631.1 and shall be installed in accordance with the manufacturer's instructions and the *International Mechanical Code*.~~))

SECTION 633 (IFGC)
STATIONARY FUEL-CELL POWER SYSTEMS

[F] 633.1 General. Stationary fuel-cell power systems having a power output not exceeding 10 MW shall be tested in accordance with ANSI/CSA FC 1 and shall be installed in accordance with the manufacturer's instructions, NFPA 853, the *International Building Code* and the *International Fire Code*.

SECTION 634 (IFGS)
CHIMNEY DAMPER OPENING AREA

634.1 Free opening area of chimney dampers. Where an unlisted decorative *appliance* for installation in a vented *fireplace* is installed, the *fireplace* damper shall have a permanent free opening equal to or greater than specified in Table 634.1.

TABLE 634.1
FREE OPENING AREA OF CHIMNEY DAMPER FOR VENTING FLUE GASES FROM UNLISTED DECORATIVE APPLIANCES FOR INSTALLATION IN VENTED FIREPLACES

CHIMNEY HEIGHT (feet)	MINIMUM PERMANENT FREE OPENING (square inches)[a]						
	8	13	20	29	39	51	64
	Appliance input rating (Btu per hour)						
6	7,800	14,000	23,200	34,000	46,400	62,400	80,000
8	8,400	15,200	25,200	37,000	50,400	68,000	86,000
10	9,000	16,800	27,600	40,400	55,800	74,400	96,400
15	9,800	18,200	30,200	44,600	62,400	84,000	108,800
20	10,600	20,200	32,600	50,400	68,400	94,000	122,200
30	11,200	21,600	36,600	55,200	76,800	105,800	138,600

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square inch = 645.16 m^2, 1 British thermal unit per hour = 0.2931 W.

a. The first six minimum permanent free openings (8 to 51 square inches) correspond approximately to the cross-sectional areas of chimneys having diameters of 3 through 8 inches, respectively. The 64-square-inch opening corresponds to the cross-sectional area of standard 8-inch by 8-inch chimney tile.

SECTION 635 (IFGC)
GASEOUS HYDROGEN SYSTEMS

635.1 Installation. The installation of gaseous hydrogen systems shall be in accordance with the applicable requirements of this code, the *International Fire Code* and the *International Building Code*.

SECTION 636 (IFGC)
OUTDOOR DECORATIVE APPLIANCES

636.1 General. Permanently fixed-in-place outdoor decorative appliances shall be tested in accordance with ANSI Z21.97 and shall be installed in accordance with the manufacturer's instructions.

Exception: A locked-open shutoff valve on containers equipped with multiple pressure relief device installations where the arrangement of the valves provides the full required flow through the minimum number of required relief devices at all times.

[F] 703.3.2 Installation. Valves and other mechanical restrictions shall not be located between the pressure relief device and the point of release to the atmosphere.

[F] 703.3.3 Containers. Containers shall be provided with pressure relief devices in accordance with the ASME *Boiler and Pressure Vessel Code* (Section VIII), DOTn 49 CFR, Parts 100-180 and Section 703.3.7.

[F] 703.3.4 Vessels other than containers. Vessels other than containers shall be protected with pressure relief devices in accordance with the ASME *Boiler and Pressure Vessel Code* (Section VIII), or DOTn 49 CFR, Parts 100-180.

[F] 703.3.5 Sizing. Pressure relief devices shall be sized in accordance with the specifications to which the container was fabricated. The relief device shall be sized to prevent the maximum design pressure of the container or system from being exceeded.

[F] 703.3.6 Protection. Pressure relief devices and any associated vent *piping* shall be designed, installed and located so that their operation will not be affected by water or other debris accumulating inside the vent or obstructing the vent.

[F] 703.3.7 Access. Pressure relief devices shall be located such that they are provided with ready *access* for inspection and repair.

[F] 703.3.8 Configuration. Pressure relief devices shall be arranged to discharge unobstructed in accordance with Section 2309 of the *International Fire Code*. Discharge shall be directed to the outdoors in such a manner as to prevent impingement of escaping gas on personnel, containers, *equipment* and adjacent structures and to prevent introduction of escaping gas into enclosed spaces. The discharge shall not terminate under eaves or canopies.

Exception: This section shall not apply to DOTn-specified containers with an internal volume of 2 cubic feet (0.057 m^3) or less.

[F] 703.4 Venting. Relief device vents shall be terminated in an *approved* location in accordance with Section 2309 of the *International Fire Code*.

[F] 703.5 Security. Compressed gas containers, cylinders, tanks and systems shall be secured against accidental dislodgement in accordance with Chapter 53 of the *International Fire Code*.

[S][F] 703.6 Electrical wiring and equipment. Electrical wiring and *equipment* shall comply with ((~~NFPA 70~~)) the *Seattle Electrical Code*.

SECTION 704 (IFGC)
PIPING, USE AND HANDLING

704.1 Applicability. Use and handling of containers, cylinders, tanks and hydrogen gas systems shall comply with this section. Gaseous hydrogen systems, *equipment* and machinery shall be *listed* or *approved*.

704.1.1 Controls. Compressed gas system controls shall be designed to prevent materials from entering or leaving process or reaction systems at other than the intended time, rate or path. Automatic controls shall be designed to be fail safe in accordance with accepted engineering practice.

704.1.2 Piping systems. *Piping*, tubing, valves and fittings conveying gaseous hydrogen shall be designed and installed in accordance with Sections 704.1.2.1 through 704.1.2.5.1, Chapter 50 of the *International Fire Code*, and ASME B31.12. Cast-iron pipe, valves and fittings shall not be used.

704.1.2.1 Sizing. Gaseous hydrogen *piping* shall be sized in accordance with *approved* engineering methods.

704.1.2.2 Identification of hydrogen piping systems. Hydrogen *piping* systems shall be marked in accordance with ANSI A13.1. Markings used for *piping* systems shall consist of the name of the contents and shall include a direction-of-flow arrow. Markings shall be provided at all of the following locations:

1. At each valve.
2. At wall, floor and ceiling penetrations.
3. At each change of direction.
4. At intervals not exceeding 20 feet (6096 mm).

704.1.2.3 Piping design and construction. *Piping* and tubing materials shall be 300 series stainless steel or materials *listed* or *approved* for hydrogen service and the use intended through the full range of operating conditions to which they will be subjected. *Piping* systems shall be designed and constructed to provide allowance for expansion, contraction, vibration, settlement and fire exposure.

IFGC/IFGS CHAPTER 8

REFERENCED STANDARDS

User note:

About this chapter: *Chapter 8 lists the full title, edition year and address of the promulgator for all standards that are referenced in the code. The section numbers in which the standards are referenced are also listed.*

This chapter lists the standards that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title, and the section or sections of this document that reference the standard. The application of the referenced standards shall be as specified in Section 102.8.

ANSI

American National Standards Institute
25 West 43rd Street
4th Floor
New York, NY 10036

ANSI A13.1—2015: Scheme for the Identification of Piping Systems
704.1.2.2

ANSI FC 1—2012: Stationery Fuel Cell Power Systems
633.1

LC 1/CSA 6.26—((~~20~~13)) 2018: Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing (CSST)
403.5.5

ANSI LC-4/CSA 6.32—2012: Press-connect Metallic Fittings for Use in Fuel Gas Distribution Systems
403.10.1, 403.10.2, 403.10.3

Z21.1—2010: Household Cooking Gas Appliances
623.1

Z21.5.1/CSA 7.1—2014: Gas Clothes Dryers—Volume I—Type 1 Clothes Dryers
613.1

Z21.5.2/CSA 7.2—2014: Gas Clothes Dryers—Volume II—Type 2 Clothes Dryers
613.1, 614.3

Z21.8—94 (R2002): Installation of Domestic Gas Conversion Burners
619.1

Z21.10.1/CSA 4.1—2012: Gas Water Heaters—Volume I—Storage, Water Heaters with Input Ratings of 75,000 Btu per Hour or Less
624.1

Z21.10.3/CSA 4.3—2011: Gas Water Heaters—Volume III—Storage, Water Heaters with Input Ratings above 75,000 Btu per Hour, Circulating and Instantaneous
624.1

Z21.11.2—2011: Gas-fired Room Heaters—Volume II—Unvented Room Heaters
621.1

Z21.13/CSA 4.9—2011: Gas-fired Low-pressure Steam and Hot Water Boilers
631.1

Z21.15/CSA 9.1—2009: Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves
Table 409.1.1

Z21.19/CSA 1.4—02(R2007): Refrigerators Using Gas (R1999) Fuel
625.1

Z21.24/CSA 6.10—2006: Connectors for Gas Appliances
411.1, 411.3

Z21.40.1/CGA 2.91—1996 (R2011): Gas-fired Heat Activated Air Conditioning and Heat Pump Appliances
627.1

Z21.40.2/CGA 2.92—1996 (R2011): Gas-fired Work Activated Air Conditioning and Heat Pump Appliances (Internal Combustion)
627.1

Z21.42—2014: Gas-fired Illuminating Appliances
628.1

CHAPTER 1

ADMINISTRATION

Note: Chapter 1 is entirely Seattle amendments to the *International Mechanical Code* and is not underlined.

SECTION 101
TITLE

101.1 Title. These regulations shall be known as the "Seattle Mechanical Code," may be cited as such, and are referred to herein as "this code." All references to the *International Mechanical Code* contained in this code mean the *Seattle Mechanical Code*.

SECTION 102
PURPOSE

102.1 Purpose. The purpose of this code is to provide minimum standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation, and maintenance or use of heating, ventilating, cooling, refrigeration systems, incinerators and other miscellaneous heat-producing appliances within the City. The purpose of this code is to provide for and promote the health, safety and welfare of the general public, and not to create or otherwise establish or designate any particular class or group of *persons* who will or should be especially protected or benefited by the terms of this code.

SECTION 103
APPLICABILITY AND SCOPE

103.1 Scope. This code applies to the erection, installation, *alteration*, repair, relocation, replacement, addition to, use or maintenance of any heating, ventilating, cooling, refrigeration systems, incinerators or other miscellaneous heat-producing appliances within the City. The design and testing of *equipment* regulated by this code are subject to the approval of the code official. The installation of fuel gas distribution piping and equipment, fuel gas-fired appliances and fuel gas-fired appliance venting systems shall be regulated by the International Fuel Gas Code. References in this code to Group R shall include Group I-1, Condition 2 assisted living facilities licensed by Washington state under chapter 388-78A WAC and Group I-1, Condition 2 residential treatment facilities licensed by Washington state under chapter 246-337 WAC.

Exceptions:

1. Detached one- and two-family dwellings and multiple single-family dwellings (*townhouse units*) not more than three stories above grade plane with a separate means of egress and their accessory structures shall comply with the *International Residential Code*.
2. The standards for liquefied petroleum gas installations are the 2017 edition of NFPA 58 (Liquefied Petroleum Gas Code) and the 2018 edition of ANSI Z223.1/NFPA 54 (National Fuel Gas Code), as amended.

103.2 Applicability of city laws. A mechanical permit application shall be considered under the Seattle Mechanical, Fuel Gas and Energy codes in effect on a date as provided below, or on a date as otherwise required by law.

1. Mechanical permit applications shall be considered under the codes in effect on the date used to determine the codes applicable to the building permit application according to Seattle Building Code Section 101.3 if any of Items 1.1 through 1.3 apply:
   - 1.1 The mechanical permit application is submitted as part of a building permit application;
   - 1.2 The mechanical permit application is for work directly associated with a building permit but is submitted separately from the building permit application; or
   - 1.3 The mechanical permit application is for initial tenant *alterations* submitted no later than 18 months after the date of the *approved* final inspection for the building, and is submitted before the expiration date of the building permit for the tenant *alteration*, as determined by *Seattle Building Code* Section 106.9.
2. Mechanical permit applications other than those subject to Item 1 shall be considered under the codes in effect on the date a complete mechanical permit application is submitted that complies with all the requirements of Section 116.

103.3 Additions, alterations and repairs. Additions, *alterations*, repairs and replacement of *equipment* or systems shall comply with the provisions for new *equipment* and systems except as otherwise provided in Section 104 of this code.

Exception: Additions, *alterations*, renovations or repairs to a mechanical system that is part of a building addition with less than 500 square feet of conditioned floor area are exempt from the requirements for *whole house ventilation systems*, Section 403.8.5.

103.4 Internal consistency. If in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive governs. If there is a conflict between a general requirement and a specific requirement, the specific requirement governs.

103.5 Referenced codes and standards. The codes and standards referenced in this code are part of the requirements of this code to the extent prescribed by each such reference. If differences occur between provisions of this code and referenced codes and standards, the provisions of this code apply.

Exception: Where enforcement of a code provision would violate the conditions of the listing of the *equipment* or appliance, the conditions of the listing and manufacturer's instructions apply.

103.6 Appendices. Provisions in the *International Mechanical Code* appendices do not apply unless specifically adopted.

103.7 Metric units. Wherever in this code there is a conflict between metric units of measurement and U.S. customary units, the U.S. customary units govern.

103.8 References to other codes. Whenever an International, National or Uniform Code is referenced in this code, it means the Seattle edition of that code, including local amendments. References to the "Building Code", "Fuel Gas Code", "Fire Code", "Residential Code" and "Plumbing Code" mean the Seattle editions of those codes.

SECTION 104
APPLICATION TO EXISTING MECHANICAL SYSTEMS

104.1 Additions, alterations, renovations or repairs. Additions, *alterations*, renovations or repairs may be made to any mechanical system without requiring the existing mechanical system to comply with all the requirements of this code, if the addition, *alteration*, renovation or repair conforms to the standards required for a new mechanical system. Additions, *alterations*, renovations or repairs shall not cause an existing system to become *unsafe*, unhealthy or overloaded.

Minor additions, *alterations*, renovations, and repairs to existing mechanical systems may be installed in accordance with the law in effect at the time the original installation was made, if *approved* by the code official.

104.2 Existing installations. Mechanical systems lawful at the time of the adoption of this code may continue their use, be maintained or repaired, be converted to another type of fuel, or have components replaced if the use, maintenance, repair, conversion of fuel, or component replacement is done in accordance with the basic original design and location, and no hazard to life, health or property has been or is created by such mechanical system.

104.3 Changes in building occupancy. Mechanical systems that are a part of a building or structure undergoing a change in *occupancy* as defined in the *International Building Code* shall comply with all requirements of this code that are applicable to the new use or *occupancy*.

104.4 Maintenance. All mechanical systems, materials, *equipment*, appurtenances and all parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe and hazard-free condition. All devices or safeguards that were required by a code in effect when the mechanical system was installed shall be maintained in conformance with the code edition under which installed. The owner or the owner's authorized agent is responsible for maintenance of mechanical systems and *equipment*. To determine compliance with this subsection, the code official may cause a mechanical system or *equipment* to be reinspected.

The fire chief and the code official each have authority to obtain compliance with the requirements of this subsection.

Exception: The code official may modify the requirements of this section where all or a portion of the building is unoccupied.

104.5 Moved buildings. Building or structures moved into or within the City shall comply with standards adopted by the code official. No building shall be moved into or within the City unless, prior to moving, the code official has inspected the building for compliance with this code and the permit holder has agreed to correct all deficiencies found and has been issued a building permit for the work. A bond or cash deposit in an amount sufficient to abate or demolish the building shall be posted prior to issuance of a permit. See Section 116 for information required on plans. Any moved building that is not in complete compliance with standards for moved buildings within eighteen months from the date of permit issuance and is found to be a public nuisance may be abated.

104.6 Landmarks—Historic buildings and structures. The code official may modify the specific requirements of this code as it applies to landmarks and require in lieu thereof alternate requirements that, in the opinion of the code official, will result in a reasonable degree of safety to the public and the occupants of those buildings.

For purposes of this section a landmark is a building or structure: that is subject to a requirement to obtain a certificate of approval from the City Landmarks Preservation Board before altering or making significant changes to specific features or char-

acteristics, that has been nominated for designation and the City Landmarks Preservation Board has not issued a determination regarding designation, that has been designated for preservation by the City Landmarks Preservation Board, that has been designated for preservation by the State of Washington, that has been listed or determined eligible to be listed in the National Register of Historic Places, or that is located in a landmark or special review district subject to a requirement to obtain a certificate of approval before making a change to the external appearance of a structure.

SECTION 105
ALTERNATE MATERIALS AND METHODS OF CONSTRUCTION

105.1 Alternate materials and methods of construction and design. This code does not prevent the use of any material, design or method of construction not specifically allowed or prohibited by this code, provided the alternate has been *approved* and its use authorized by the code official. The code official may approve an alternate, provided the code official finds that the proposed alternate complies with the provisions of this code and that the alternate, when considered together with other safety features of the building or other relevant circumstances, will provide at least an equivalent level of strength, effectiveness, fire resistance, durability, safety and sanitation. The code official may require that sufficient evidence or proof be submitted to reasonably substantiate any claims regarding the use or suitability of the alternate. The code official may, but is not required to, record the approval of alternates and any relevant information in the files of the code official or on the *approved* construction documents.

SECTION 106
MODIFICATIONS

106.1 Modifications. The code official may modify the provisions of this code for individual cases if the code official finds: (1) there are practical difficulties involved in carrying out the provisions of this code; (2) the modification is in conformity with the intent and purpose of this code; and (3) the modification will provide a reasonable level of strength, effectiveness, fire resistance, durability, safety and sanitation when considered together with other safety features of the building or other relevant circumstances. The code official may, but is not required to, record the approval of modifications and any relevant information in the files of the code official or on the *approved* construction documents.

SECTION 107
TESTS

107.1 Tests. Whenever there is insufficient evidence of compliance with the provisions of this code or evidence that any material or method of construction does not conform to the requirements of this code, the code official may require tests as proof of compliance, to be made at no expense to the City. Test methods shall be as specified in this code or by other recognized test standards. If there are no recognized and accepted test methods for the proposed alternate, the code official shall determine the test procedures. All tests shall be made by an *approved* agency. Reports of such tests shall be retained by the code official for the period required for retention of public records.

SECTION 108
ORGANIZATION AND DUTIES OF CODE OFFICIAL

108.1 Jurisdiction of the Department of Construction and Inspections. The Department of Construction and Inspections is authorized to administer and enforce this code. The Department of Construction and Inspections is under the administrative and operational control of the Director, who is the code official.

108.2 Designees. The code official may appoint such officers, inspectors, assistants and employees as are authorized from time to time. The code official may authorize such employees and other agents as may be necessary to carry out the functions of the code official.

108.3 Right of entry. With the consent of the owner or occupier of a building or premises, or pursuant to a lawfully issued warrant, the code official may enter a building or premises at any reasonable time to perform the duties imposed by this code.

108.4 Liability. Nothing in this code is intended to be nor shall be construed to create or form the basis for any liability on the part of the City, or its officers, employees or agents, for any injury or damage resulting from the failure of *equipment* to conform to the provisions of this code, or by reason or as a consequence of any inspection, notice, order, certificate, permission or approval authorized or issued or done in connection with the implementation or enforcement of this code, or by reason of any action or inaction on the part of the City related in any manner to the enforcement of this code by its officers, employees or agents.

This code shall not be construed to lessen or relieve the responsibility of any *person* owning, operating or controlling any *equipment*, building or structure for any damages to *persons* or property caused by defects, nor shall the Seattle Department of

Construction and Inspections or the City of Seattle be held to have assumed any such liability by reason of the inspections authorized by this code or any permits or certificates issued under this code.

108.5 Responsibility for compliance. Compliance with the requirements of this code is the obligation of the owner of the building, structure or premises, the authorized agent of the owner, and other *persons* responsible for the condition or work, and not of the City or any of its officers, employees or agents.

SECTION 109
MEANS OF APPEAL

[A] 109.1 Application for appeal. A person shall have the right to appeal a decision of the code official to the board of appeals. An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply, or an equally good or better form of construction is proposed. The application shall be filed on a form obtained from the code official within 20 days after the notice was served.

[A] 109.1.1 Limitation of authority. The board of appeals shall not have authority relative to interpretation of the administration of this code nor shall such board be empowered to waive requirements of this code.

[A] 109.2 Membership of board. The board of appeals shall consist of five members appointed by the chief appointing authority as follows: one for 5 years; one for 4 years; one for 3 years; one for 2 years; and one for 1 year. Thereafter, each new member shall serve for 5 years or until a successor has been appointed.

[A] 109.2.1 Qualifications. The board of appeals shall consist of five individuals, one from each of the following professions or disciplines.

1. *Registered design professional* who is a registered architect; or a builder or superintendent of building construction with not less than 10 years' experience, 5 of which shall have been in responsible charge of work.
2. *Registered design professional* with structural engineering or architectural experience.
3. *Registered design professional* with mechanical and plumbing engineering experience; or a mechanical contractor with not less than 10 years' experience, 5 of which shall have been in responsible charge of work.
4. *Registered design professional* with electrical engineering experience; or an electrical contractor with not less than 10 years' experience, 5 of which shall have been in responsible charge of work.
5. *Registered design professional* with fire protection engineering experience; or a fire protection contractor with not less than 10 years' experience, 5 of which shall have been in responsible charge of work.

[A] 109.2.2 Alternate members. The chief appointing authority shall appoint two alternate members who shall be called by the board chairman to hear appeals during the absence or disqualification of a member. Alternate members shall possess the qualifications required for board membership and shall be appointed for 5 years, or until a successor has been appointed.

[A] 109.2.3 Chairman. The board shall annually select one of its members to serve as chairman.

[A] 109.2.4 Disqualification of member. A member shall not hear an appeal in which that member has a personal, professional or financial interest.

[A] 109.2.5 Secretary. The chief administrative officer shall designate a qualified clerk to serve as secretary to the board. The secretary shall file a detailed record of all proceedings in the office of the chief administrative officer.

[A] 109.2.6 Compensation of members. Compensation of members shall be determined by law.

[A] 109.3 Notice of meeting. The board shall meet upon notice from the chairman, within 10 days of the filing of an appeal, or at stated periodic meetings.

[A] 109.4 Open hearing. Hearings before the board shall be open to the public. The appellant, the appellant's representative, the code official and any person whose interests are affected shall be given an opportunity to be heard.

[A] 109.4.1 Procedure. The board shall adopt and make available to the public through the secretary procedures under which a hearing will be conducted. The procedures shall not require compliance with strict rules of evidence, but shall mandate that only relevant information be received.

[A] 109.5 Postponed hearing. When five members are not present to hear an appeal, either the appellant or the appellant's representative shall have the right to request a postponement of the hearing.

[A] 109.6 Board decision. The board shall modify or reverse the decision of the code official by a concurring vote of three members.

[A] 109.6.1 Resolution. The decision of the board shall be by resolution. Certified copies shall be furnished to the appellant and to the code official.

[A] 109.6.2 Administration. The code official shall take immediate action in accordance with the decision of the board.

[A] 109.7 Court review. Any person, whether or not a previous party of the appeal, shall have the right to apply to the appropriate court for a writ of certiorari to correct errors of law. Application for review shall be made in the manner and time required by law following the filing of the decision in the office of the chief administrative officer.

SECTION 110
TEMPORARY EQUIPMENT, SYSTEMS AND USES

[A] 110.1 General. The code official is authorized to issue a permit for temporary *equipment*, systems and uses. Such permits shall be limited as to time of service, but shall not be permitted for more than 180 days. The code official is authorized to grant extensions for demonstrated cause.

[A] 110.2 Conformance. Temporary *equipment*, systems and uses shall conform to the structural strength, fire safety, means of egress, accessibility, light, ventilation and sanitary requirements of this code as necessary to ensure the public health, safety and general welfare.

[A] 110.3 Temporary utilities. The code official is authorized to give permission to temporarily supply utilities before an installation has been fully completed and the final certificate of completion has been issued. The part covered by the temporary certificate shall comply with the requirements specified for temporary lighting, heat or power in the code.

[A] 110.4 Termination of approval. The code official is authorized to terminate such permit for temporary *equipment*, systems or uses and to order the temporary *equipment*, systems or uses to be discontinued.

SECTION 111
RULES OF THE CODE OFFICIAL

111.1 Authority. The code official has authority to issue interpretations of this code and to adopt and enforce rules and regulations supplemental to this code as may be deemed necessary to clarify the application of the provisions of this code. Such interpretations, rules and regulations shall be in conformity with the intent and purpose of this code.

111.2 Procedure for adoption of rules. The code official shall promulgate, adopt and issue rules according to the procedures specified in the Administrative Code, Chapter 3.02 of the Seattle Municipal Code.

SECTION 112
CONSTRUCTION CODES ADVISORY BOARD

112.1 Construction Codes Advisory Board committee. A committee of the Construction Codes Advisory Board may examine proposed administrative rules, and amendments relating to this code and related provisions of other codes and make recommendations to the code official and to the City Council for changes in this code. The committee will be called on as needed by the Construction Codes Advisory Board.

SECTION 113
PERMITS

113.1 Permits required. Except as otherwise specifically provided in this code, a permit shall be obtained from the code official prior to each installation, *alteration*, repair, replacement or remodel of any *equipment* or mechanical system regulated by this code. A separate mechanical permit is required for each separate building or structure.

113.2 Work exempt from permit.

113.2.1 Mechanical. A mechanical permit is not required for the work listed below.

1. Portable heating appliances, portable ventilating *equipment*, and portable cooling units, if the total capacity of these portable appliances does not exceed 40 percent of the cumulative heating, cooling or ventilating requirements of a building or *dwelling unit* and does not exceed 3 kW or 10,000 Btu input.
2. Any closed system of steam, hot or chilled water piping within heating or cooling *equipment* regulated by this code.
3. Minor work or the replacement of any component part of a mechanical system that does not alter its original approval and complies with other applicable requirements of this code.

113.2.2 Refrigeration. A mechanical permit is not required for the following refrigerant *equipment*:

1. Any self-contained refrigerating *equipment* for which an operating permit is not required.
2. Any self-contained refrigeration system that does not exceed three horsepower rating.

113.3 Compliance required. All work shall comply with this code, even where no permit is required.

113.4 Flood hazard areas. In addition to the permit required by this section, all work to be performed in areas of special flood hazard as defined in Chapter 25.06 of the *Seattle Municipal Code,* subject to additional standards and requirements set forth in Chapter 25.06, the Seattle Floodplain Development Ordinance.

113.5 Emergency repairs. In the case of an emergency, the installation, *alteration* or repair of any refrigeration system or *equipment* may be made without a permit, provided that application for a permit is made within the later of 24 hours or one working day from the time when the emergency work was started.

SECTION 114
APPLICATION FOR PERMIT

114.1 Application. To obtain a permit, the applicant shall first file an application in a format determined by the code official. Every such application shall:

1. Identify and describe the work to be covered by the permit for which application is made.
2. Describe the land on which the proposed work is to be done by legal description, property address or similar description that will readily identify and definitely locate the proposed building or work.
3. Provide the contractor's business name, address, phone number and current contractor registration number (required if contractor has been selected). To obtain a permit for work on a refrigeration system, the applicant shall also provide the number of the refrigeration contractor license issued by the City.
4. Be accompanied by construction documents, including plans, diagrams, computations and specifications, *equipment* schedules and other data as required in Sections 116.2 and 116.3.
5. State the valuation of the mechanical work to be done. The valuation of the mechanical work is the estimated current value of all labor and material, whether actually paid for or not, for which the permit is sought.
6. Be signed by the owner of the property or building, or the owner's authorized agent, who may be required to submit evidence to indicate such authority.
7. Give such other data and information as may be required by the code official.
8. State the name of the owner and the name, address and phone number of a contact *person.*
9. Substantially conform with applicable law in effect on the date described in Section R101.3, as modified by any exception.

114.2 Construction documents. Construction documents shall be submitted in one or more sets with each application for a permit, or shall be submitted in electronic format determined by the code official. The code official may require plans, computations and specifications to be prepared and designed by an engineer or architect licensed by the state to practice as such. Projects having a total mechanical valuation of $50,000 or larger shall have a mechanical engineering stamp and signature on each sheet.

Exception: A mechanical engineer's stamp or submission of construction documents is not required if the code official finds that the nature of the work applied for is such that review of construction documents is not necessary to obtain compliance with this code.

114.3 Information on construction documents.

114.3.1 Clarity of plans. Plans shall be drawn to a clearly indicated and commonly accepted scale in a format determined by the code official.

114.3.2 Fire-resistive notes. The code official may require that plans for buildings more than two stories in height of other than Group R-3 and Group U *occupancies* indicate how required structural and fire-resistive integrity will be maintained where a penetration will be made for electrical, mechanical, plumbing and communication conduits, pipes and similar systems.

114.3.3 Information required on plans. The plans or specifications shall show the following:

1. Layout for each floor with dimensions of all working spaces and a legend of all symbols used.
2. Location, size and material of all piping.
3. Location, size and materials of all air ducts, air inlets and air outlets.
4. Location of all fans, warm-air furnaces, boilers, absorption units, refrigerant compressors and condensers and the weight of all pieces of such *equipment* weighing 200 pounds or more.
5. Rated capacity or horsepower and efficiency rating of all boilers, warm-air furnaces, heat exchangers, blower fans, refrigerant compressors and absorption units. See also the *International Energy Conservation Code.*
6. Location, size and material of all *combustion* products vents and *chimneys.*
7. Location and area of all ventilation and *combustion* air openings and ducts.

8. Location of all air dampers and fire shutters.
9. The first sheet of each set of plans and specifications shall show the address of the proposed work and the name and address of the owner or lessee of the premises.
10. Architectural drawings, typical envelope cross sections and other drawings or data may be required to support system sizing calculations or other thermal requirements of this code or the *International Energy Conservation Code*.

SECTION 115
APPLICATION REVIEW AND PERMIT ISSUANCE

115.1 Issuance. The application and construction documents shall be reviewed by the code official. The construction documents may be reviewed by other departments of the City to check compliance with the laws and ordinances under their jurisdiction.

115.1.1 Issuance of permit. The code official shall issue a permit to the applicant if the code official finds the following:

1. The work described in the construction documents substantially conforms to the requirements of this code and other pertinent laws and ordinances;
2. The fees specified in the Seattle Municipal Code, Title 22, Subtitle IX, Permit Fees have been paid; and
3. The applicant has complied with all requirements to be performed prior to issuance of a permit for the work under other pertinent laws, ordinances or regulations or included in a master use permit, or otherwise imposed by the building official.

When the permit is issued, the applicant or the applicant's authorized agent becomes the permit holder.

115.1.2 Compliance with approved construction documents. When the code official issues a permit, the code official shall endorse the permit in writing or in electronic format and stamp the plans "APPROVED." Such *approved* plans and permit shall not be changed, modified or altered without authorization from the code official, and all work shall be done in accordance with the *approved* construction documents and permit except as authorized by the code official during a field inspection to correct errors or omissions, or as authorized by Section 115.2.

115.2 Revisions to the permit. When changes to the *approved* work are made during construction, approval of the code official shall be obtained prior to execution. The building or mechanical inspector may approve minor changes for work not reducing the structural strength or fire and life safety of the structure. The building or mechanical inspector shall determine if it is necessary to revise the *approved* construction documents. If revised plans are required, changes shall be submitted to and *approved* by the code official, accompanied by fees specified in the Seattle Municipal Code, Title 22, Subtitle IX, Permit Fees prior to *occupancy*. All changes shall conform to the requirements of this code and other pertinent laws and ordinances and other issued permits.

Minor changes shall not incur additional fees if these changes do not (1) add to the general scope of work; (2) change the basic design concept; (3) involve major relocation of *equipment*, ducts, or pipes; (4) substantially alter *approved equipment* size; or (5) require extensive re-review of the plans and specifications.

115.3 Cancellation of permit applications. Applications may be cancelled if no permit is issued by the earlier of the following: (1) twelve months following the date of application; or (2) sixty days after the date of written notice that the permit is ready to be issued. After cancellation, construction documents may be returned to the applicant or destroyed by the code official.

The code official shall notify the applicant in writing at least 30 days before the application is cancelled. The notice shall specify a date by which a request for extension must be submitted in order to avoid cancellation. The date shall be at least two weeks prior to the date on which the application will be cancelled.

115.4 Extensions prior to permit issuance. At the discretion of the code official, applications for projects that require more than 12 months to review and approve may be extended for a period that provides reasonable time to complete the review and approval, but in no case longer than 24 months from the date of the original application. No application may be extended more than once. After cancellation, the applicant shall submit a new application and pay a new fee to restart the permit process.

Notwithstanding other provisions of this code, applications may be extended where issuance of the permit is delayed by litigation, preparation of environmental impact statements, appeals, strikes or other causes related to the application that are beyond the applicant's control, or while the applicant is making progress toward issuance of a master use permit.

115.5 Retention of plans. One set of *approved* plans, which may be on microfilm or in electronic format, shall be retained by the code official. One set of *approved* plans shall be returned to the applicant and shall be kept at the site of the building or work for use by the inspection personnel at all times when the work authorized is in progress.

115.6 Validity of permit. The issuance or granting of a permit or approval of construction documents shall:

1. Not be construed to be a permit for, or an approval of, any violation of any of the provisions of this code or other pertinent laws and ordinances.

2. Not prevent the code official from requiring the correction of errors in the construction documents, or from preventing building operations being carried on thereunder when in violation of this code or of other pertinent laws and ordinances of the City.
3. Not prevent the code official from requiring correction of conditions found to be in violation of this code or other pertinent laws and ordinances of the City, or
4. Not be construed to extend the period of time for which any such permit is issued or otherwise affect any period of time for compliance specified in any notice or order issued by the code official or other administrative authority requiring the correction of any such conditions.

115.7 Expiration of permits. Authority to do the work authorized by a permit expires 18 months from the date of issuance. An *approved* renewal extends the life of a permit for an additional 18 months from the prior expiration date. An *approved* reestablishment extends the life of the permit for 18 months from the date the permit expired.

Exceptions:

1. Initial permits for major construction projects that require more than 18 months to complete may be issued for a period that provides reasonable time to complete the work, according to an *approved* construction schedule. The building official may authorize a permit expiration date not to exceed three years from the date of issuance.
2. The code official may issue permits that expire in less than 18 months if the code official determines a shorter period is appropriate to complete the work.

115.8 Renewal of permits. Permits may be renewed and renewed permits may be further renewed by the code official, if the following conditions are met:

1. Application for renewal is made within the 30 day period immediately preceding the date of expiration of the permit; and
2. If the project has had an associated discretionary Land Use review, and the land use approval has not expired; and
3. If an application for renewal is made more than 18 months after the date of mandatory compliance with a new or revised edition of this code, the permit shall not be renewed unless:

   3.1 The code official determines that the permit complies, or is modified to comply with the Seattle Mechanical, Fuel Gas and Energy codes in effect on the date of application for renewal; or

   3.2 The work authorized by the permit is substantially underway and progressing at a rate *approved* by the building official. “Substantially underway” means that normally required inspections have been *approved* for work such as foundations, framing, mechanical, insulation and finish work is being completed on a continuing basis; or

   3.3 Commencement or completion of the work authorized by the permit is delayed by litigation, appeals, strikes or other extraordinary circumstances related to the work authorized by the permit, beyond the permit holder’s control, subject to approval by the code official.

[S] 115.9 Reestablishment of expired permits. A new permit is required to complete work if a permit has expired and was not renewed.

Exception: A permit that expired less than one year prior to the date of a request for reestablishment may be reestablished upon approval of the code official if it complies with Items 2 and 3 of Section 115.8. Once re-established the permit will not be considered to have expired. The new expiration date of a re-established permit shall be determined in accordance with Section 115.7.

115.10 Revocation of mechanical permits. Whenever the code official determines there are grounds for revoking a permit, the code official may issue a notice of revocation. The notice of revocation shall identify the reason for the proposed revocation, including, but not limited to, the violations, the conditions violated, and any alleged false or misleading information provided.

115.10.1 Standards for revocation. The code official may revoke a permit if:

1. The code or the permit has been or is being violated and issuance of a notice of violation or stop work order has been or would be ineffective to secure compliance because of circumstances related to the violation; or
2. The permit was obtained with false or misleading information.

115.10.2 Service of notice of revocation. The notice of revocation shall be served upon the owner, agent or other responsible *person* by personal service or regular first class mail addressed to the last known address of such *person* or if no address is available after reasonable inquiry, the notice may be posted in a conspicuous place on the premises. The notice may also be posted if served by personal service or first class mail.

115.10.3 Effective date of revocation. The code official shall identify in the notice of revocation a date certain on which the revocation will take effect. This date may be stayed pending complete review by the code official pursuant to Section 117.10.4.

115.10.4 Review by the code official for notice of revocation. Any *person* aggrieved by a notice of revocation may obtain a review by making a request in writing to the code official within three business days of the date of service of the notice of revocation. The review shall occur within five business days after receipt by the building official of the request for review. Any *person* affected by the notice of revocation may submit additional information to the building official for consideration as part of the review at any time prior to the review.

115.10.4.1 Review procedure. The review will be made by a representative of the code official who will review all additional information received and may also request a site visit. After the review, the code official may:

1. Sustain the notice of revocation and affirm or modify the date the revocation will take effect;
2. Withdraw the notice of revocation;
3. Modify the notice of revocation and affirm or modify the date the revocation will take effect; or
4. Continue the review to a date certain.

115.10.4.2 Order of revocation of permit. The code official shall issue an order containing the decision within ten days after the review is completed and shall cause the same to be sent by regular first class mail to the *person* or *persons* requesting the review, any other *person* on whom the notice of revocation was served, and any other *person* who requested a copy before issuance of the order. The order of the building official is the final order of the City, and the City and all parties shall be bound by the order.

SECTION 116
INSPECTIONS

116.1 General. All construction or work for which a permit is required is subject to inspection by the code official, and certain types of construction shall have special inspections by registered special inspectors specified in Chapter 17 of the *International Building Code*. In addition to the inspections specified above, the code official may make or require any other inspections of any mechanical work to ascertain compliance with the provisions of this code and other laws and ordinances that are enforced by the code official.

116.2 Inspection requests. The owner of the property or the owner's authorized agent, or the *person* designated by the owner or agent to do the work authorized by a permit shall notify the code official that work requiring inspection as specified in this section and Section 120 is ready for inspection.

116.3 Access for inspection. The permit holder and the *person* requesting any inspections required by this code shall provide access to and means for proper inspection of such work, including safety *equipment* required by the Washington Industrial Safety and Health Agency. The work shall remain accessible and exposed for inspection purposes until *approved* by the code official. Neither the code official nor the City shall be liable for expense entailed in the required removal or replacement of any material to allow inspection.

116.4 Inspection record. Work requiring a mechanical permit shall not be commenced until the permit holder or the permit holder's agent has posted an inspection record in a conspicuous place on the premises and in a position that allows the code official to conveniently make the required entries regarding inspection of the work. This record shall be maintained in such a position by the permit holder or the permit holder's agent until final approval has been granted by the code official.

116.5 Approvals required. No work shall be done on any part of the building or structure beyond the point indicated in each successive inspection without first obtaining the written approval of the code official.

116.5.1 Effect of approval. Approval as a result of an inspection is not approval of any violation of the provisions of this code or of other pertinent laws and ordinances of the City. Inspections presuming to give authority to violate or cancel the provisions of this code or of other pertinent laws and ordinances of the City are not valid.

116.6 Final inspection. When the installation of a mechanical system is complete, an additional and final inspection shall be made.

116.7 Operation of mechanical equipment. The requirements of this section do not prohibit the operation of any mechanical systems installed to replace existing *equipment* or fixtures serving an occupied portion of the building in the event a request for inspection of such *equipment* or fixture has been filed with the code official not more than 48 hours after such replacement work is completed, and before any portion of such mechanical system is concealed by any permanent portion of the building.

116.8 Testing of equipment and systems. Refrigeration *equipment* regulated by this code shall be tested and *approved* as required by Chapter 11 of this code. Fuel-oil piping shall be tested and *approved* as required by Chapter 13 of this code.

116.9 Special investigation. If work that requires a permit or approval is commenced or performed prior to making formal application and receiving the code official's permission to proceed, the code official may make a special investigation inspection before a permit is issued for the work. If a special investigation is made, a special investigation fee may be assessed in accordance with the Fee Subtitle.

116.10 Reinspections. The code official may require a reinspection if work for which inspection is called is not complete, required corrections are not made, the inspection record is not properly posted on the work site, the *approved* plans are not readily available to the inspector, access is not provided on the date for which inspection is requested, if deviations from construction documents that require the approval of the code official have been made without proper approval, or as otherwise required by the code official.

116.10.1 Compliance with Section 104.4. For the purpose of determining compliance with Section 104.4, Maintenance, the code official or the fire chief may cause any structure or system to be reinspected.

116.10.2 Reinspection fee. The code official may assess a reinspection fee as set forth in the *Seattle Municipal Code*, Title 22, Subtitle IX, Permit Fees for any action for which reinspection is required. In instances where reinspection fees have been assessed, no additional inspection of the work will be performed until the required fees have been paid.

SECTION 117
CONNECTION APPROVAL

117.1 Energy connections. No *person* shall make connections from a source of energy fuel to a mechanical system or *equipment* regulated by this code for which a permit is required until *approved* by the code official.

117.2 Temporary connections. The code official may authorize temporary connection of the mechanical *equipment* to the source of energy fuel for the purpose of testing the *equipment*, or for use under a temporary certificate of *occupancy*.

SECTION 118
REFRIGERATION LICENSES

118.1 Refrigeration licenses. No *person* shall perform any of the services or activities related to refrigeration systems regulated by Chapter 11 without a license required by Chapter 6.410 of the *Seattle Municipal Code*, or under the direct supervision of a *person* holding a required license.

SECTION 119
OPERATING PERMITS FOR REFRIGERATION SYSTEMS

119.1 An operating permit issued by the code official is required to operate any refrigeration system meeting any one of the following criteria:

1. Any system over 50 horsepower, or
2. Any system over 50 tons of refrigerant effect, or
3. Any system that contains over 150 pounds of refrigerant, or
4. Any system that includes a refrigerant containing a pressure vessel over six inches in diameter with a capacity of more than 5 cubic feet and a design working pressure under 250 psig, or
5. Any system that includes a refrigerant containing a pressure vessel over six inches in diameter having a capacity of one and one-half cubic feet and a design working pressure over 250 psig.

119.2 The operating permit will not be issued until the system has been inspected and *approved* by the code official as safe to operate and in compliance with the provisions of this code. The permit is valid for a period of one year, renewable annually. The permit shall be displayed in a conspicuous place adjacent to the refrigeration system.

SECTION 120
FEES

120.1 Fees. A fee for each mechanical permit and for other activities related to the enforcement of this code shall be paid as set forth in the *Seattle Municipal Code*, Title 22, Subtitle IX, Permit Fees.

CHAPTER 2

DEFINITIONS

User note:

About this chapter: *Codes, by their very nature, are technical documents. Every word, term and punctuation mark can add to or change the meaning of a technical requirement. It is necessary to maintain a consensus on the specific meaning of each term contained in the code. Chapter 2 performs this function by stating clearly what specific terms mean for the purposes of the code.*

SECTION 201
GENERAL

201.1 Scope. Unless otherwise expressly stated, the following words and terms shall, for the purposes of this code, have the meanings indicated in this chapter.

201.2 Interchangeability. Words used in the present tense include the future; words in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

[S] 201.3 Terms defined in other codes. Where terms are not defined in this code and are defined in the *International Building Code*, *International Fire Code*, *Seattle Electrical Code*, *International Fuel Gas Code* or the ((~~*International*~~)) *Uniform Plumbing Code*, such terms shall have meanings ascribed to them as in those codes.

201.4 Terms not defined. Where terms are not defined through the methods authorized by this section, such terms shall have ordinarily accepted meanings such as the context implies.

SECTION 202
GENERAL DEFINITIONS

ABRASIVE MATERIALS. Moderately abrasive particulate in high concentrations, and highly abrasive particulate in moderate and high concentrations, such as alumina, bauxite, iron silicate, sand and slag.

ABSORPTION SYSTEM. A refrigerating system in which refrigerant is pressurized by pumping a chemical solution of refrigerant in absorbent, and then separated by the addition of heat in a generator, condensed (to reject heat), expanded, evaporated (to provide refrigeration), and reabsorbed in an absorber to repeat the cycle; the system can be single or multiple effect, the latter using multiple stages or internally cascaded use of heat to improve efficiency.

ACCESS (TO). That which enables a device, *appliance* or *equipment* to be reached by ready access or by a means that first requires the removal or movement of a panel or similar obstruction [see also "Ready access (to)"].

AIR. Air supplied to mechanical *equipment* and appliances for *combustion*, ventilation, cooling and similar purposes. Standard air is air at standard temperature and pressure, namely, 70ºF (21ºC) and 29.92 inches of mercury (101.3 kPa).

AIR CONDITIONING. The treatment of air so as to control simultaneously the temperature, humidity, cleanness and distribution of the air to meet the requirements of a conditioned space.

AIR-CONDITIONING SYSTEM. A system that consists of heat exchangers, blowers, filters, supply, exhaust and return ducts, and shall include any apparatus installed in connection therewith.

AIR DISPERSION SYSTEM. Any diffuser system designed to both convey air within a room, space or area and diffuse air into that space while operating under positive pressure. Systems are commonly constructed of, but not limited to, fabric or plastic film.

AIR DISTRIBUTION SYSTEM. Any system of ducts, plenums and air-handling *equipment* that circulates air within a space or spaces and includes systems made up of one or more air-handling units.

AIR, EXHAUST. Air being removed from any space, *appliance* or piece of *equipment* and conveyed directly to the atmosphere by means of openings or ducts.

AIR-HANDLING UNIT. A blower or fan used for the purpose of distributing supply air to a room, space or area.

AIR, MAKEUP. Any combination of outdoor and transfer air intended to replace exhaust air and exfiltration.

AIR, OUTDOOR. Ambient air that enters a building through a ventilation system, through intentional openings for natural ventilation, or by infiltration.

AIR, TRANSFER. Air moved from one indoor space to another.

[A] ALTERATION. A change in a mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation.

APPLIANCE. A device or apparatus that is manufactured and designed to utilize energy and for which this code provides specific requirements.

APPLIANCE, EXISTING. Any *appliance* regulated by this code that was legally installed prior to the effective date of this code, or for which a permit to install has been issued.

APPLIANCE TYPE.

High-heat appliance. Any *appliance* in which the products of *combustion* at the point of entrance to the flue under normal operating conditions have a temperature greater than 2,000ºF (1093ºC).

Low-heat appliance (residential appliance). Any *appliance* in which the products of *combustion* at the point of entrance to the flue under normal operating conditions have a temperature of 1,000ºF (538ºC) or less.

Medium-heat appliance. Any *appliance* in which the products of *combustion* at the point of entrance to the flue under normal operating conditions have a temperature of more than 1,000ºF (538ºC), but not greater than 2,000ºF (1093ºC).

APPLIANCE, VENTED. An *appliance* designed and installed in such a manner that all of the products of *combustion* are conveyed directly from the *appliance* to the outdoor atmosphere through an *approved chimney* or vent system.

[A] APPROVED. Acceptable to the code official.

[A] APPROVED AGENCY. An established and recognized agency that is regularly engaged in conducting tests, furnishing inspection services or furnishing product certification where such agency has been approved by the code official.

[S] ((~~AUTOMATIC BOILER.~~ ~~Any class of boiler that is equipped with the controls and limit devices specified in Chapter 10.~~))

[W] BALANCED WHOLE HOUSE VENTILATION. Any combination of concurrently operating residential unit mechanical exhaust and mechanical supply whereby the total mechanical exhaust airflow rate is within 10 percent or 5 cfm, whichever is greater, of the total mechanical supply airflow rate. Intermittent dryer exhaust, intermittent range hood exhaust, and intermittent toilet room exhaust airflow rates above the residential dwelling or sleeping unit minimum ventilation rate are exempt from the balanced airflow calculation.

BATHROOM. A room containing a bathtub, shower, spa or similar bathing fixture.

[S] BOILER. A closed ((~~heating *appliance* intended to supply hot water or steam for space heating, processing or power purposes~~)) vessel in which water is heated, steam is generated, steam is superheated, or any combination thereof, under pressure or vacuum by the direct application of heat. ((~~Low-pressure boilers operate at pressures less than or equal to 15 pounds per square inch (psi) (103 kPa) for steam and 160 psi (1103 kPa) for water. High-pressure boilers operate at pressures exceeding those pressures.~~)) The term "boiler" shall also include fired units for heating or vaporizing liquids other than water where these systems are complete within themselves.

[S] BOILER CODE. The *Seattle Boiler* and *Pressure Vessel Code.*

BOILER ROOM. A room primarily utilized for the installation of a boiler.

BRAZED JOINT. A gas-tight joint obtained by the joining of metal parts with metallic mixtures or alloys that melt at a temperature above 1,000ºF (538ºC), but lower than the melting temperature of the parts to be joined.

BRAZING. A metal joining process wherein coalescence is produced by the use of a nonferrous filler metal having a melting point above 1,000ºF (538ºC), but lower than that of the base metal being joined. The filler material is distributed between the closely fitted surfaces of the joint by capillary attraction.

BREATHING ZONE. The region within an occupied space between planes 3 and 72 inches (76 and 1829 mm) above the floor and more than 2 feet (610 mm) from the walls of the space or from fixed air-conditioning *equipment*.

BTU. Abbreviation for British thermal unit, which is the quantity of heat required to raise the temperature of 1 pound (454 g) of water 1ºF (0.56ºC) (1 Btu = 1055 J).

[A] BUILDING. Any structure utilized or intended for supporting or sheltering any *occupancy*.

[BF] CEILING RADIATION DAMPER. A *listed* device installed in a ceiling membrane of a fire-resistance-rated floor/ceiling or roof/ceiling assembly to limit automatically the radiative heat transfer through an air inlet/outlet opening.

CHIMNEY. A primarily vertical structure containing one or more flues, for the purpose of carrying gaseous products of *combustion* and air from a fuel-burning *appliance* to the outdoor atmosphere.

Factory-built chimney. A *listed* and *labeled chimney* composed of factory-made components, assembled in the field in accordance with manufacturer's instructions and the conditions of the listing.

Masonry chimney. A field-constructed *chimney* composed of solid masonry units, bricks, stones or concrete.

Metal chimney. A field-constructed *chimney* of metal.

CHIMNEY CONNECTOR. A pipe that connects a fuel-burning *appliance* to a *chimney*.

CLEARANCE. The minimum distance through air measured between the heat-producing surface of the mechanical *appliance*, device or *equipment* and the surface of the combustible material or assembly.

CLOSED COMBUSTION SOLID-FUEL-BURNING APPLIANCE. A heat-producing *appliance* that employs a *combustion* chamber that does not have openings other than the flue collar, fuel charging door and adjustable openings provided to control the amount of *combustion air* that enters the *combustion* chamber.

CLOTHES DRYER. An *appliance* used to dry wet laundry by means of heat.

[S][A] CODE. These regulations, subsequent amendments thereto, or any emergency rule or regulation that ((~~the administrative authority having jurisdiction~~)) has been lawfully adopted.

[S][A] CODE OFFICIAL. The ((~~officer or other designated authority charged with the administration and enforcement of this code~~)) Director of the Department of Construction and Inspections, or a duly authorized representative.

[BF] COMBINATION FIRE/SMOKE DAMPER. A *listed* device installed in ducts and air transfer openings designed to close automatically upon the detection of heat and resist the passage of flame and smoke. The device is installed to operate automatically, be controlled by a smoke detection system, and where required, is capable of being positioned from a fire command center.

COMBUSTIBLE ASSEMBLY. Wall, floor, ceiling or other assembly constructed of one or more component materials that are not defined as noncombustible.

[F] COMBUSTIBLE LIQUID. A liquid having a closed cup flash point at or above 100ºF (38ºC). Combustible liquids shall be subdivided as follows:

Class II. Liquids having a closed cup flash point at or above 100ºF (38ºC) and below 140ºF (60ºC).

Class IIIA. Liquids having a closed cup flash point at or above 140ºF (60ºC) and below 200ºF (93ºC).

Class IIIB. Liquids having a closed cup flash point at or above 200ºF (93ºC).

The category of combustible liquids does not include compressed gases or cryogenic fluids.

COMBUSTIBLE MATERIAL. Any material not defined as noncombustible.

COMBUSTION. In the context of this code, refers to the rapid oxidation of fuel accompanied by the production of heat or heat and light.

COMBUSTION AIR. Air necessary for complete *combustion* of a fuel, including *theoretical air* and excess air.

COMBUSTION CHAMBER. The portion of an *appliance* within which *combustion* occurs.

COMBUSTION PRODUCTS. Constituents resulting from the *combustion* of a fuel with the oxygen of the air, including the inert gases, but excluding excess air.

COMMERCIAL COOKING APPLIANCES. Appliances used in a commercial food service establishment for heating or cooking food. For the purpose of this definition, a commercial food service establishment is where food is prepared for sale or is prepared on a scale that is by volume and frequency not representative of domestic household cooking.

COMMERCIAL COOKING RECIRCULATING SYSTEM. Self-contained system consisting of the exhaust hood, the cooking *equipment*, the filters and the fire suppression system. The system is designed to capture cooking vapors and residues generated from commercial cooking *equipment*. The system removes contaminants from the *exhaust air* and recirculates the air to the space from which it was withdrawn.

COMMERCIAL KITCHEN HOODS.

Backshelf hood. A backshelf hood is also referred to as a low-proximity hood, or as a sidewall hood where wall mounted. Its front lower lip is low over the *appliance*(s) and is "set back" from the front of the appliance(s). It is always closed to the rear of the appliances by a panel where free-standing, or by a panel or wall where wall mounted, and its height above the cooking surface varies. (This style of hood can be constructed with partial end panels to increase its effectiveness in capturing the effluent generated by the cooking operation).

Double island canopy hood. A double island canopy hood is placed over back-to-back appliances or *appliance* lines. It is open on all sides and overhangs both fronts and the sides of the *appliance*(s). It could have a wall panel between the backs of the appliances. (The fact that *exhaust air* is drawn from both sides of the double canopy to meet in the center causes each side of this hood to emulate a wall canopy hood, and thus it functions much the same with or without an actual wall panel between the backs of the appliances).

Eyebrow hood. An eyebrow hood is mounted directly to the face of an *appliance*, such as an oven and dishwasher, above the opening(s) or door(s) from which effluent is emitted, extending past the sides and overhanging the front of the opening to capture the effluent.

Pass-over hood. A pass-over hood is a free-standing form of a backshelf hood constructed low enough to pass food over the top.

Single island canopy hood. A single island canopy hood is placed over a single *appliance* or *appliance* line. It is open on all sides and overhangs the front, rear and sides of the *appliance*(s). A single island canopy is more susceptible to cross drafts and requires a greater *exhaust air* flow than an equivalent sized wall-mounted canopy to capture and contain effluent generated by the cooking operation(s).

Wall canopy hood. A wall canopy exhaust hood is mounted against a wall above a single *appliance* or line of *appliance*(s), or it could be free-standing with a back panel from the rear of the appliances to the hood. It overhangs the front and sides of the *appliance*(s) on all open sides.

The wall acts as a back panel, forcing the *makeup air* to be drawn across the front of the cooking *equipment*, thus increasing the effectiveness of the hood to capture and contain effluent generated by the cooking operation(s).

COMPENSATING HOODS. *Compensating hoods* are those having integral (built-in) *makeup air* supply. The *makeup air* supply for such hoods is generally supplied from: short-circuit flow from inside the hood, air curtain flow from the bottom of the front face, and front face discharge from the outside front wall of the hood. The compensating makeup airflow can also be supplied from the rear or side of the hood, or the rear, front or sides of the cooking *equipment*. The makeup airflow can be one or a combination of methods.

COMPRESSOR. A specific machine, with or without accessories, for compressing a gas.

COMPRESSOR, POSITIVE DISPLACEMENT. A compressor in which increase in pressure is attained by changing the internal volume of the compression chamber.

COMPRESSOR UNIT. A compressor with its prime mover and accessories.

CONCEALED LOCATION. A location that cannot be accessed without damaging permanent parts of the building structure or finish surface. Spaces above, below or behind readily removable panels or doors shall not be considered as concealed.

CONDENSATE. The liquid that condenses from a gas (including flue gas) caused by a reduction in temperature.

CONDENSER. A heat exchanger designed to liquefy refrigerant vapor by removal of heat.

CONDENSING UNIT. A specific refrigerating machine combination for a given refrigerant, consisting of one or more power-driven compressors, condensers and, where required, liquid receivers, and the regularly furnished accessories.

[S] CONDITIONED SPACE. An area ((~~,~~)) <u>or</u> room ((~~or space that is enclosed~~)) within ((~~the~~)) <u>a</u> building ((~~thermal envelope and that is directly heated or cooled or that is indirectly~~)) <u>being</u> heated or cooled<u>, containing uninsulated ducts, or with a fixed opening directly into an adjacent conditioned space</u>. ((~~Spaces are indirectly heated or cooled where they communicate through openings with conditioned spaces, where they are separated from conditioned spaces by uninsulated walls, floors or ceilings, or where they contain uninsulated ducts, piping or other sources of heating or cooling.~~)) <u>Elevator shafts, stair enclosures, enclosed corridors connecting conditioned spaces, and enclosed spaces, through which conditioned air is transferred at a rate exceeding three air changes per hour are considered conditioned spaces for the purpose of the building thermal envelope requirements.</u>

<u>**[S] CONFINED SPACE.** A space having a volume less than 50 cubic feet per 1,000 Btu per hour (Btu/h) (4.8 m^3/kW) of the aggregate input rating of all appliances installed in that space.</u>

[A] CONSTRUCTION DOCUMENTS. The written, graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of the project necessary for obtaining a building permit. The construction drawings shall be drawn to an appropriate scale.

<u>**[S] CONTAINER (REFRIGERANT).** A cylinder for the transportation of refrigerant.</u>

CONTROL. A manual or automatic device designed to regulate the gas, air, water or electrical supply to, or operation of, a mechanical system.

CONVERSION BURNER. A burner designed to supply gaseous fuel to an *appliance* originally designed to utilize another fuel.

COOKING APPLIANCE. See "*Commercial cooking appliances*."

DAMPER. A manually or automatically controlled device to regulate draft or the rate of flow of air or *combustion* gases.

Volume damper. A device that, where installed, will restrict, retard or direct the flow of air in a duct, or the products of *combustion* in a heat-producing *appliance*, its vent connector, vent or *chimney* therefrom.

[BS] DESIGN FLOOD ELEVATION. The elevation of the "design flood," including wave height, relative to the datum specified on the community's legally designated flood hazard area map. In areas designated as Zone AO, the *design flood elevation* shall be the elevation of the highest existing grade of the building's perimeter plus the depth number, in feet, specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number shall be taken as being equal to 2 feet (610 mm).

DESIGN WORKING PRESSURE. The maximum allowable working pressure for which a specific part of a system is designed.

[S] DIRECT REFRIGERATION SYSTEM. A system in which the evaporator or condenser of the refrigerating system is in direct contact with the air or other substances to be cooled or heated. See Figure 2-1 for a diagram of a type of direct refrigeration system.

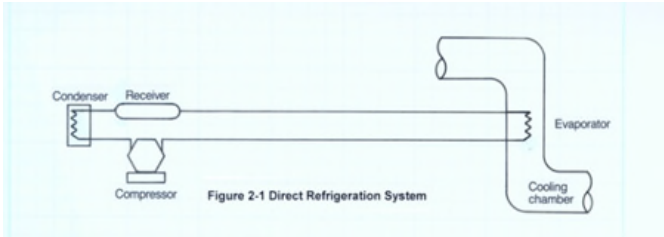


Figure 2-1 Direct Refrigeration System

DIRECT SOLAR SYSTEM. A solar thermal system in which the gas or liquid in the solar collector loop is not separated from the load.

[FG] DIRECT-VENT APPLIANCES. Appliances that are constructed and installed so that all air for *combustion* is derived from the outdoor atmosphere and all flue gases are discharged to the outdoor atmosphere.

DISCRETE PRODUCT. Products that are noncontinuous, individual, distinct pieces such as, but not limited to, electrical, plumbing and mechanical products and duct straps, duct fittings, duct registers and pipe hangers.

[W] DISTRIBUTED WHOLE HOUSE VENTILATION. A whole house ventilation system shall be considered distributed when it supplies outdoor air directly (not transfer air) to each dwelling or sleeping unit habitable space, (living room, den, office, interior adjoining spaces or bedroom), and exhausts air from all kitchens and bathrooms directly outside.

DRAFT. The pressure difference existing between the *appliance* or any component part and the atmosphere, that causes a continuous flow of air and products of *combustion* through the gas passages of the *appliance* to the atmosphere.

Induced draft. The pressure difference created by the action of a fan, blower or ejector, that is located between the *appliance* and the *chimney* or vent termination.

Natural draft. The pressure difference created by a vent or *chimney* because of its height, and the temperature difference between the flue gases and the atmosphere.

DRAIN-BACK SYSTEM. A solar thermal system in which the fluid in the solar collector loop is gravity drained from the collector into a holding tank under prescribed circumstances.

DRIP. The container placed at a low point in a system of piping to collect condensate and from which the condensate is removable.

DRY CLEANING SYSTEMS. Dry cleaning plants or systems are classified as follows:

Type I. Those systems using Class I flammable liquid solvents having a flash point below 100ºF (38ºC).

Type II. Those systems using Class II combustible liquid solvents having a flash point at or above 100ºF (38ºC) and below 140ºF (60ºC).

Type III. Those systems using Class III combustible liquid solvents having a flash point at or above 140ºF (60ºC).

Types IV and V. Those systems using Class IV nonflammable liquid solvents.

DUCT. A tube or conduit utilized for conveying air. The air passages of self-contained systems are not to be construed as air ducts.

DUCT FURNACE. A warm-air furnace normally installed in an air distribution duct to supply warm air for heating. This definition shall apply only to a warm-air heating *appliance* that, for air circulation, depends on a blower not furnished as part of the furnace.

DUCT SYSTEM. A continuous passageway for the transmission of air that, in addition to ducts, includes duct fittings, dampers, plenums, fans and accessory air-handling *equipment* and appliances.

DUCTLESS MINI-SPLIT SYSTEM. A heating and cooling system that is comprised of one or multiple indoor evaporator/air-handling units and an outdoor condensing unit that is connected by refrigerant piping and electrical wiring. A ductless mini-split system is capable of cooling or heating one or more rooms without the use of a traditional ductwork system.

[BG] DWELLING. A building or portion thereof that contains not more than two *dwelling* units.

[A] DWELLING UNIT. A single unit providing complete, independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.

ELECTRIC HEATING APPLIANCE. An *appliance* that produces heat energy to create a warm environment by the application of electric power to resistance elements, refrigerant compressors or dissimilar material junctions.

ENERGY RECOVERY VENTILATION SYSTEM. Systems that employ air-to-air heat exchangers to recover energy from or reject energy to *exhaust air* for the purpose of pre-heating, precooling, humidifying or dehumidifying outdoor *ventilation air* prior to supplying such air to a space, either directly or as part of an HVAC system.

[S] ENVIRONMENTAL AIR. Air that is, at temperatures not exceeding 250ºF (121ºC), conveyed to or from occupied areas through ducts that are not part of the heating or air-conditioning system, such as ventilation for human usage, *relief air*, domestic kitchen range exhaust, bathroom exhaust, domestic clothes dryer exhaust, transformer vault exhaust, elevator exhaust, and parking garage exhaust.

EQUIPMENT. Piping, ducts, vents, control devices and other components of systems other than appliances that are permanently installed and integrated to provide control of environmental conditions for buildings. This definition shall also include other systems specifically regulated in this code.

EQUIPMENT, EXISTING. Any *equipment* regulated by this code which was legally installed prior to the effective date of this code, or for which a permit to install has been issued.

EVAPORATIVE COOLER. A device used for reducing the sensible heat of air for cooling by the process of evaporation of water into an airstream.

EVAPORATIVE COOLING SYSTEM. The *equipment* and appliances intended or installed for the purpose of environmental cooling by an evaporative cooler from which the conditioned air is distributed through ducts or plenums to the conditioned area.

EVAPORATOR. That part of the system in which liquid refrigerant is vaporized to produce refrigeration.

EXCESS AIR. The amount of air provided in addition to *theoretical air* to achieve complete *combustion* of a fuel, thereby preventing the formation of dangerous products of *combustion*.

EXFILTRATION. Uncontrolled outward air leakage from conditioned spaces through unintentional openings in ceilings, floors and walls to unconditioned spaces or the outdoors caused by pressure differences across these openings resulting from wind, the stack effect created by temperature differences between indoors and outdoors, and imbalances between supply and exhaust airflow rates.

EXHAUST SYSTEM. An assembly of connected ducts, plenums, fittings, registers, grilles and hoods through which air is conducted from the space or spaces and exhausted to the outdoor atmosphere.

[S] EXIT PASSAGEWAY. An exit component that provides a protected path of egress travel in a horizontal direction to an exit or to the exit discharge.

Note: The exit passageway definition is repeated verbatim from the 2018 Seattle Building Code.

EXTRA-HEAVY-DUTY COOKING APPLIANCE. Extra-heavy-duty cooking appliances are those utilizing open flame combustion of solid fuel at any time.

[S] FIRE AREA. The aggregate floor area enclosed and bounded by *fire walls*, *fire barriers*, *exterior walls* or *horizontal assemblies* of a building. Areas of the building not provided with surrounding walls shall be included in the fire area if such areas are included within the horizontal projection of the roof or floor next above.

[BF] FIRE DAMPER. A *listed* device installed in ducts and air transfer openings designed to close automatically upon detection of heat and to restrict the passage of flame. Fire dampers are classified for use in either static systems that will automatically shut down in the event of a fire, or in dynamic systems that continue to operate during a fire. A dynamic fire damper is tested and rated for closure under elevated temperature airflow.

FIREPLACE. An assembly consisting of a hearth and fire chamber of noncombustible material and provided with a *chimney*, for use with solid fuels.

Factory-built fireplace. A *listed* and *labeled* fireplace and *chimney* system composed of factory-made components, and assembled in the field in accordance with manufacturer's instructions and the conditions of the listing.

Masonry fireplace. A field-constructed fireplace composed of solid masonry units, bricks, stones or concrete.

FIREPLACE STOVE. A free-standing chimney-connected solid-fuel-burning heater, designed to be operated with the fire chamber doors in either the open or closed position.

[FG] FLAME SAFEGUARD. A device that will automatically shut off the fuel supply to a main burner or group of burners when the means of ignition of such burners becomes inoperative, and when flame failure occurs on the burner or group of burners.

[BF] FLAME SPREAD INDEX. The numerical value assigned to a material tested in accordance with ASTM E 84 or UL 723.

FLAMMABILITY CLASSIFICATION. Refrigerants shall be assigned to one of the three classes—1, 2 or 3—in accordance with ASHRAE 34. For Classes 2 and 3, the heat of *combustion* shall be calculated assuming that *combustion* products are in the gas phase and in their most stable state.

Class 1. Refrigerants that do not show flame propagation when tested in air at 14.7 psia (101 kPa) and 140ºF (60ºC).

Class 2. Refrigerants having a lower flammability limit (LFL) of more than 0.00625 pound per cubic foot (0.10 kg/m^3) at 140ºF (60ºC) and 14.7 psia (101 kPa) and a heat of combustion of less than 8169 Btu/lb (19 000 kJ/kg).

Class 3. Refrigerants that are highly flammable, having a LFL of less than or equal to 0.00625 pound per cubic foot (0.10 kg/m^3) at140ºF (60ºC) and 14.7 psia (101 kPa) or a heat of combustion greater than or equal to 8169 Btu/lb (19 000 kJ/kg).

[F] FLAMMABLE LIQUIDS. Any liquid that has a flash point below 100ºF (38ºC), and has a vapor pressure not exceeding 40 psia (276 kPa) at 100ºF (38ºC). Flammable liquids shall be known as Class I liquids and shall be divided into the following classifications:

Class IA. Liquids having a flash point below 73ºF (23ºC) and a boiling point below 100ºF (38ºC).

Class IB. Liquids having a flash point below 73ºF (23ºC) and a boiling point at or above 100ºF (38ºC).

Class IC. Liquids having a flash point at or above 73ºF (23ºC) and below 100ºF (38ºC).

[F] FLAMMABLE VAPOR OR FUMES. Mixtures of gases in air at concentrations equal to or greater than the LFL and less than or equal to the upper flammability limit (UFL).

[F] FLASH POINT. The minimum temperature corrected to a pressure of 14.7 psia (101 kPa) at which the application of a test flame causes the vapors of a portion of the sample to ignite under the conditions specified by the test procedures and apparatus. The flash point of a liquid shall be determined in accordance with ASTM D 56, ASTM D 93 or ASTM D 3278.

FLEXIBLE AIR CONNECTOR. A conduit for transferring air between an air duct or plenum and an air terminal unit or between an air duct or plenum and an air inlet or air outlet. Such conduit is limited in its use, length and location.

FLOOR AREA, NET. The actual occupied area, not including unoccupied accessory areas or thicknesses of walls.

[FG] FLOOR FURNACE. A completely self-contained furnace suspended from the floor of the space being heated, taking air for *combustion* from outside such space and with means for observing flames and lighting the *appliance* from such space.

FLUE. A passageway within a *chimney* or vent through which gaseous *combustion* products pass.

FLUE CONNECTION (BREECHING). A passage for conducting the products of *combustion* from a fuel-fired *appliance* to the vent or *chimney* (see also "*Chimney* connector" and "Vent connector").

[FG] FLUE GASES. Products of *combustion* and excess air.

FLUE LINER (LINING). A system or material used to form the inside surface of a flue in a *chimney* or vent, for the purpose of protecting the surrounding structure from the effects of *combustion* products and conveying *combustion* products without leakage to the atmosphere.

FOOD-GRADE FLUID. Potable water or a fluid containing additives listed in accordance with the Code of Federal Regulations, Title 21, Food and Drugs, Chapter 1, Food and Drug Administration, Parts 174-186.

[FG] FUEL GAS. A natural gas, manufactured gas, liquefied petroleum gas or a mixture of these.

FUEL OIL. Kerosene or any hydrocarbon oil having a flash point not less than 100ºF (38ºC).

FUEL-OIL PIPING SYSTEM. A closed piping system that connects a combustible liquid from a source of supply to a fuel-oil-burning *appliance*.

FURNACE. A completely self-contained heating unit that is designed to supply heated air to spaces remote from or adjacent to the *appliance* location.

FURNACE ROOM. A room primarily utilized for the installation of fuel-burning, space-heating and water-heating appliances other than boilers (see also "Boiler room").

FUSIBLE PLUG. A device arranged to relieve pressure by operation of a fusible member at a predetermined temperature.

[S][F] GAS ROOM. A separately ventilated, fully enclosed room in which only compressed gases and associated *equipment* and supplies are stored or used.

GROUND SOURCE HEAT PUMP LOOP SYSTEM. Piping buried in horizontal or vertical excavations or placed in a body of water for the purpose of transporting heat transfer liquid to and from a heat pump. Included in this definition are closed loop systems in which the liquid is recirculated and open loop systems in which the liquid is drawn from a well or other source.

HAZARDOUS LOCATION. Any location considered to be a fire hazard for flammable vapors, dust, combustible fibers or other highly combustible substances. The location is not necessarily categorized in the *International Building Code* as a high-hazard use group classification.

HEAT EXCHANGER. A device that transfers heat from one medium to another.

HEAT PUMP. A refrigeration system that extracts heat from one substance and transfers it to another portion of the same substance or to a second substance at a higher temperature for a beneficial purpose.

HEAT TRANSFER LIQUID. The operating or thermal storage liquid in a mechanical system, including water or other liquid base, and additives at the concentration present under operating conditions used to move heat from one location to another. Refrigerants are not included as heat transfer liquids.

HEAVY-DUTY COOKING APPLIANCE. Heavy-duty cooking *appliances* include electric under-fired broilers, electric chain (conveyor) broilers, gas under-fired broilers, gas chain (conveyor) broilers, gas open-burner ranges (with or without oven), electric and gas wok ranges, smokers, smoker ovens, and electric and gas over-fired (upright) broilers and salamanders.

HIGH-PROBABILITY SYSTEMS. A refrigeration system in which the basic design or the location of components is such that a leakage of refrigerant from a failed connection, seal or component will enter an *occupancy* classified area, other than the *machinery room*.

[S][B] HIGH-RISE BUILDING. A building with an occupied floor located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access.

HIGH-SIDE PRESSURE. The parts of a refrigerating system subject to condenser pressure.

HIGH-VOLUME, LARGE-DIAMETER FAN. A low-speed ceiling fan that circulates large volumes of air and that is greater than 7 feet (2134 mm) in diameter.

[S] HOOD. An air intake device used to capture by entrapment, impingement, adhesion or similar means, grease, moisture, heat and similar contaminants before they enter a duct system.

Type I. A kitchen hood for collecting and removing grease vapors and smoke generated from medium-duty, heavy-duty, extra-heavy-duty, and some *light-duty cooking appliances*. Such hoods are equipped with a fire suppression system.

Type II. A general kitchen hood for collecting and removing steam, vapor, heat, odors and products of *combustion* generated from some *light-duty cooking appliances*.

[FG] HYDROGEN GENERATING APPLIANCE. A self-contained package or factory-matched packages of integrated systems for generating gaseous hydrogen. Hydrogen generating appliances utilize electrolysis, reformation, chemical, or other processes to generate hydrogen.

IGNITION SOURCE. A flame, spark or hot surface capable of igniting flammable vapors or fumes. Such sources include *appliance* burners, burner ignitors and electrical switching devices.

[F] IMMEDIATELY DANGEROUS TO LIFE OR HEALTH (IDLH). The concentration of airborne contaminants that poses a threat of death, immediate or delayed permanent adverse health effects, or effects that could prevent escape from such an environment. This contaminant concentration level is established by the National Institute of Occupational Safety and Health (NIOSH) based on both toxicity and flammability. It is generally expressed in parts per million by volume (ppm v/v) or milligrams per cubic meter (mg/m^3).

[S] INDIRECT REFRIGERATION SYSTEM. A system in which a secondary coolant cooled or heated by the refrigerating system is circulated to the air or other substance to be cooled or heated. See Figure 2-2. Indirect systems are distinguished by the following methods of application:

Closed system. A system in which a secondary fluid is either cooled or heated by the refrigerating system and then circulated within a closed circuit in indirect contact with the air or other substance to be cooled or heated.

Double-indirect open-spray system. A system in which the secondary substance for an indirect open-spray system is heated or cooled by an intermediate coolant circulated from a second enclosure.

Open-spray system. A system in which a secondary coolant is cooled or heated by the refrigerating system and then circulated in direct contact with the air or other substance to be cooled or heated.

Vented closed system. A system in which a secondary coolant is cooled or heated by the refrigerating system and then passed through a closed circuit in the air or other substance to be cooled or heated, except that the evaporator or condenser is placed in an open or appropriately vented tank.

[S]

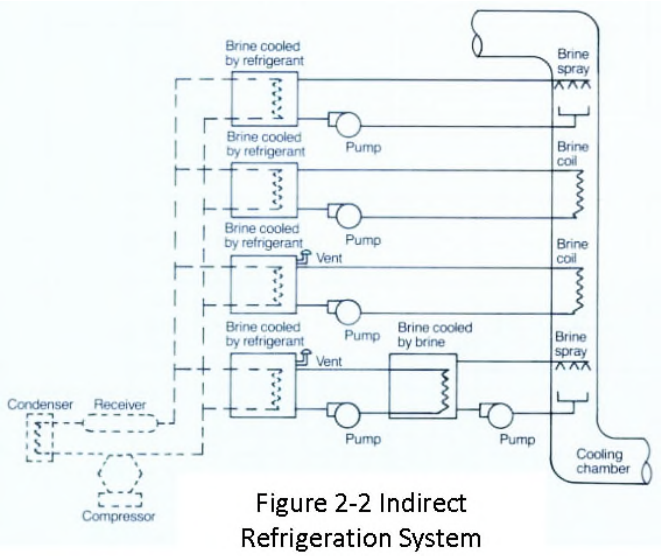


Figure 2-2 Indirect Refrigeration System

INDIRECT SOLAR SYSTEM. A solar thermal system in which the gas or liquid in the solar collector loop circulates between the solar collector and a heat exchanger and such gas or liquid is not drained from the system or supplied to the load during normal operation.

INFILTRATION. Uncontrolled inward air leakage to conditioned spaces through unintentional openings in ceilings, floors and walls from unconditioned spaces or the outdoors caused by pressure differences across these openings resulting from wind, the stack effect created by temperature differences between indoors and outdoors, and imbalances between supply and exhaust airflow rates.

[S] INTERIOR EXIT STAIRWAY. An exit component that serves to meet one or more means of egress design requirements, such as required number of exits or exit access travel distance, and provides for a protected path of egress travel to the exit discharge or public way.

Note: The interior exit stairway definition is repeated verbatim from the 2018 Seattle Building Code.

INTERLOCK. A device actuated by another device with which it is directly associated, to govern succeeding operations of the same or allied devices. A circuit in which a given action cannot occur until after one or more other actions have taken place.

JOINT, FLANGED. A joint made by bolting together a pair of flanged ends.

JOINT, FLARED. A metal-to-metal compression joint in which a conical spread is made on the end of a tube that is compressed by a flare nut against a mating flare.

JOINT, PLASTIC ADHESIVE. A joint made in thermoset plastic piping by the use of an adhesive substance that forms a continuous bond between the mating surfaces without dissolving either one of them.

JOINT, PLASTIC HEAT FUSION. A joint made in thermoplastic piping by heating the parts sufficiently to permit fusion of the materials when the parts are pressed together.

JOINT, PLASTIC SOLVENT CEMENT. A joint made in thermoplastic piping by the use of a solvent or solvent cement that forms a continuous bond between the mating surfaces.

JOINT, SOLDERED. A gas-tight joint obtained by the joining of metal parts with metallic mixtures of alloys that melt at temperatures between 400ºF (204ºC) and 1,000ºF (538ºC).

JOINT, WELDED. A gas-tight joint obtained by the joining of metal parts in molten state.

[A] LABELED. *Equipment*, materials or products to which have been affixed a label, seal, symbol or other identifying mark of a nationally recognized testing laboratory, approved agency or other organization concerned with product evaluation that maintains periodic inspection of the production of the labeled items and whose labeling indicates either that the *equipment*, material or product meets identified standards or has been tested and found suitable for a specified purpose.

[S] LIGHT-DUTY COOKING APPLIANCE. Light-duty cooking *appliances* include gas and electric ovens of a maximum 6 kW or 20,000 Btu/h capacity (including standard, bake, roasting, revolving, retherm, convection, combination convection/steamer, countertop conveyorized baking/finishing, deck and pastry), electric and gas steam-jacketed kettles, electric and gas pasta cookers, electric and gas compartment steamers (both pressure and atmospheric) and electric and gas cheesemelters.

[FG] LIMIT CONTROL. A device responsive to changes in pressure, temperature or level for turning on, shutting off or throttling the gas supply to an *appliance*.

LIMITED CHARGE SYSTEM. A system in which, with the compressor idle, the design pressure will not be exceeded when the refrigerant charge has completely evaporated.

[A] LISTED. *Equipment*, materials, products or services included in a list published by an organization acceptable to the code official and concerned with evaluation of products or services that maintains periodic inspection of production of *listed equipment* or materials or periodic evaluation of services and whose listing states either that the *equipment*, material, product or service meets identified standards or has been tested and found suitable for a specified purpose.

LIVING SPACE. Space within a *dwelling unit* utilized for living, sleeping, eating, cooking, bathing, washing and sanitation purposes.

[W] LOCAL EXHAUST. An exhaust system that uses one or more fans to exhaust air from a specific room or rooms within a residential dwelling or *sleeping unit*.

LOW-PROBABILITY PUMP. A pump that is designed to prevent atmospheric release of the pumped fluid by one of the following methods: 1. The pump is permanently sealed; 2. The pump incorporates a static seal; 3. The pump incorporates not less than two sequential dynamic shaft seals to isolate the pumped fluid from atmosphere at shaft penetrations and automatically shuts down upon failure of any seal.

LOWER EXPLOSIVE LIMIT (LEL). See "LFL."

LOWER FLAMMABLE LIMIT (REFRIGERANT)
(LFL). The minimum concentration of refrigerant that is capable of propagating a flame through a homogeneous mixture of refrigerant and air.

[F] LOWER FLAMMABLE LIMIT (LFL). The minimum concentration of vapor in air at which propagation of flame will occur in the presence of an ignition source. The LFL is sometimes referred to as LEL or lower explosive limit.

LOW-PRESSURE HOT-WATER-HEATING BOILER. A boiler furnishing hot water at pressures not exceeding 160 psi (1103 kPa) and at temperatures not exceeding 250ºF (121ºC).

LOW-PRESSURE STEAM-HEATING BOILER. A boiler furnishing steam at pressures not exceeding 15 psi (103 kPa).

LOW-PROBABILITY SYSTEMS. A refrigeration system in which the basic design or the location of components is such that a leakage of refrigerant from a failed connection, seal or component will not enter an occupancy-classified area, other than the *machinery room*.

LOW-SIDE PRESSURE. The parts of a refrigerating system subject to evaporator pressure.

MACHINERY ROOM. An enclosed space that is required by Chapter 11 to contain refrigeration equipment and to comply with Sections 1105 and 1106.

MECHANICAL DRAFT SYSTEM. A venting system designed to remove flue or vent gases by mechanical means, that consists of an induced-draft portion under nonpositive static pressure or a forced-draft portion under positive static pressure.

Forced-draft venting system. A portion of a venting system using a fan or other mechanical means to cause the removal of flue or vent gases under positive static pressure.

Induced-draft venting system. A portion of a venting system using a fan or other mechanical means to cause the removal of flue or vent gases under nonpositive static vent pressure.

Power venting system. A portion of a venting system using a fan or other mechanical means to cause the removal of flue or vent gases under positive static vent pressure.

MECHANICAL EQUIPMENT/APPLIANCE ROOM. A room or space in which nonfuel-fired mechanical *equipment* and *appliances* are located.

MECHANICAL EXHAUST SYSTEM. A system for removing air from a room or space by mechanical means.

MECHANICAL JOINT.

1. A connection between pipes, fittings, or pipes and fittings that is not welded, brazed, caulked, soldered, solvent cemented or heat fused.
2. A general form of gas or liquid-tight connections obtained by the joining of parts through a positive holding mechanical construction such as, but not limited to, flanged, screwed, clamped or flared connections.

MECHANICAL SYSTEM. A system specifically addressed and regulated in this code and composed of components, devices, *appliances* and *equipment*.

MEDIUM-DUTY COOKING APPLIANCE. Medium-duty cooking *appliances* include electric discrete element ranges (with or without oven), electric and gas hot-top ranges, electric and gas griddles, electric and gas double-sided griddles, electric and gas fryers (including open deep fat fryers, donut fryers, kettle fryers and pressure fryers), electric and gas conveyor pizza ovens, electric and gas tilting skillets (braising pans) and electric and gas rotisseries.

MODULAR BOILER. A steam or hot-water-heating assembly consisting of a group of individual boilers called modules intended to be installed as a unit without intervening stop valves. Modules are under one jacket or are individually jacketed. The individual modules shall be limited to a maximum input rating of 400,000 Btu/h (117 228 W) gas, 3 gallons per hour (gph) (11.4 L/h) oil, or 115 kW (electric).

NATURAL DRAFT SYSTEM. A venting system designed to remove flue or vent gases under nonpositive static vent pressure entirely by natural draft.

NATURAL VENTILATION. The movement of air into and out of a space through intentionally provided openings, such as windows and doors, or through nonpowered ventilators.

NET OCCUPIABLE FLOOR AREA. The floor area of an *occupiable space* defined by the inside surfaces of its walls but excluding shafts, column enclosures and other permanently enclosed, inaccessible and unoccupiable areas. Obstructions in the space such as furnishings, display or storage racks and other obstructions, whether temporary or permanent, shall not be deducted from the space area.

NO-FLOW CONDITION (SOLAR). A condition where thermal energy is not transferred from a solar thermal collector by means of flow of a heat transfer fluid.

NONFOOD-GRADE FLUID. Any fluid that is not designated as a food-grade fluid.

NONABRASIVE/ABRASIVE MATERIALS. Nonabrasive particulate in high concentrations, moderately abrasive particulate in low and moderate concentrations, and highly abrasive particulate in low concentrations, such as alfalfa, asphalt, plaster, gypsum and salt.

NONCOMBUSTIBLE MATERIALS. Materials that, when tested in accordance with ASTM E 136, have not fewer than three of four specimens tested meeting all of the following criteria:

1. The recorded temperature of the surface and interior thermocouples shall not at any time during the test rise more than 54ºF (30ºC) above the furnace temperature at the beginning of the test.
2. There shall not be flaming from the specimen after the first 30 seconds.
3. If the weight loss of the specimen during testing exceeds 50 percent, the recorded temperature of the surface and interior thermocouples shall not at any time during the test rise above the furnace air temperature at the beginning of the test, and there shall not be flaming of the specimen.

[A] OCCUPANCY. The purpose for which a building, or portion thereof, is utilized or occupied.

OCCUPATIONAL EXPOSURE LIMIT (OEL). The time-weighted average (TWA) concentration for a normal 8-hour workday and a 40-hour workweek to which nearly all workers can be repeatedly exposed without adverse effect, based on the OSHA PEL, ACGIH TLV-TWA, TERA OARS WEEL, or consistent value.

OCCUPIABLE SPACE. An enclosed space intended for human activities, excluding those spaces intended primarily for other purposes, such as storage rooms and *equipment* rooms, that are only intended to be occupied occasionally and for short periods of time.

OFFSET (VENT). A combination of *approved* bends that make two changes in direction bringing one section of the vent out of line but into a line parallel with the other section.

OUTDOOR AIR. Air taken from the outdoors, and therefore not previously circulated through the system.

OUTDOOR OPENING. A door, window, louver or skylight openable to the outdoor atmosphere.

OUTLET. A threaded connection or bolted flange in a piping system to which a gas-burning *appliance* is attached.

PANEL HEATING. A method of radiant space heating in which heat is supplied by large heated areas of room surfaces. The heating element usually consists of warm water piping, warm air ducts, or electrical resistance elements embedded in or located behind ceiling, wall or floor surfaces.

PELLET FUEL-BURNING APPLIANCE. A closed-combustion, vented *appliance* equipped with a fuel-feed mechanism for burning processed pellets of solid fuel of a specified size and composition.

[W] PERMANENT CONSTRUCTION. Construction that if removed would disturb the structural integrity of the building or the fire resistance rating of a building assembly.

[S] PERSON. Any individual, receiver, administrator, executor, assignee, trustee in bankruptcy, trust, estate, firm, partnership, joint venture, club, company, joint stock company, business trust, municipal corporation, political subdivision of the State of Washington, corporation, limited liability company, association, society or any group of individuals acting as a unit, whether mutual, cooperative, fraternal, nonprofit or otherwise, and the United States or any instrumentality thereof.

PIPING. Where used in this code, "piping" refers to either pipe or tubing, or both.

Pipe. A rigid conduit of iron, steel, copper, copper-alloy, or plastic.

Tubing. Semirigid conduit of copper, copper-alloy, aluminum, plastic or steel.

PLASTIC, THERMOPLASTIC. A plastic that is capable of being repeatedly softened by increase of temperature and hardened by decrease of temperature.

PLASTIC, THERMOSETTING. A plastic that is capable of being changed into a substantially infusible or insoluble product when cured under application of heat or chemical means.

PLENUM. An enclosed portion of the building structure, other than an *occupiable space* being conditioned, that is designed to allow air movement, and thereby serve as part of an air distribution system.

POLLUTION-CONTROL UNIT (PCU). Manufactured equipment that is installed in a grease exhaust duct system for the purpose of extracting smoke, grease particles and odors from the exhaust flow by means of a series of filters.

PORTABLE FUEL CELL APPLIANCE. A fuel cell generator of electricity that is not fixed in place. A portable fuel cell *appliance* utilizes a cord and plug connection to a grid-isolated load and has an integral fuel supply.

[S] ((~~POWER BOILER.~~ ~~See "Boiler."~~))

[A] PREMISES. A lot, plot or parcel of land, including any structure thereon.

PRESS-CONNECT JOINT. A permanent mechanical joint incorporating an elastomeric seal or an elastomeric seal and corrosion-resistant grip ring. The joint is made with a pressing tool and jaw or ring approved by the fitting manufacturer.

PRESSURE, FIELD TEST. A test performed in the field to prove system tightness.

PRESSURE-LIMITING DEVICE. A pressure-responsive mechanism designed to stop automatically the operation of the pressure-imposing element at a predetermined pressure.

PRESSURE RELIEF DEVICE. A pressure-actuated valve or rupture member designed to relieve excessive pressure automatically.

PRESSURE RELIEF VALVE. A pressure-actuated valve held closed by a spring or other means and designed to relieve pressure automatically in excess of the device's setting.

[S] ((~~PRESSURE VESSELS.~~ ~~Closed containers, tanks or vessels that are designed to contain liquids or gases, or both, under pressure.~~))

PRESSURE VESSELS—REFRIGERANT. Any refrigerant-containing receptacle in a refrigerating system. This does not include evaporators where each separate section does not exceed 0.5 cubic foot (0.014 m^3) of refrigerant-containing volume, regardless of the maximum inside dimensions, evaporator coils, controls, headers, pumps and piping.

[S] PRODUCT-CONVEYING. Conveying solid particulates, such as refuse, dust, fumes and smoke; liquid particulate matter, such as spray residue, mists and fogs; vapors, such as vapors from flammable or corrosive liquids; noxious and toxic gases; and air at temperatures exceeding 250ºF (121ºC). Examples include, but are not limited to, *combustion* engine, industrial vacuum system, chemical booth, paint booth, paint enclosure and photo lab exhaust.

PROTECTIVE ASSEMBLY (REDUCED CLEARANCE). Any noncombustible assembly that is *labeled* or constructed in accordance with Table 308.4.2 and is placed between combustible materials or assemblies and mechanical appliances, devices or *equipment*, for the purpose of reducing required airspace clearances. Protective assemblies attached directly to a combustible assembly shall not be considered as part of that combustible assembly.

PURGE. To clear of air, water or other foreign substances.

PUSH-FIT JOINTS. A type of mechanical joint consisting of elastomeric seals and corrosion-resistant tube grippers. Such joints are permanent or removable depending on the design.

QUICK-OPENING VALVE. A valve that opens completely by fast action, either manually or automatically controlled. A valve requiring one-quarter round turn or less is considered to be quick opening.

RADIANT HEATER. A heater designed to transfer heat primarily by direct radiation.

READY ACCESS (TO). That which enables a device, *appliance* or *equipment* to be directly reached, without requiring the removal or movement of any panel or similar obstruction [see "Access (to)"].

RECEIVER, LIQUID. A vessel permanently connected to a refrigeration system by inlet and outlet pipes for storage of liquid refrigerant.

RECIRCULATED AIR. Air removed from a conditioned space and intended for reuse as supply air.

RECLAIMED REFRIGERANTS. Refrigerants reprocessed to the same specifications as for new refrigerants by means including distillation. Such refrigerants have been chemically analyzed to verify that the specifications have been met. Reclaiming usually implies the use of processes or procedures that are available only at a reprocessing or manufacturing facility.

RECOVERED REFRIGERANTS. Refrigerants removed from a system in any condition without necessarily testing or processing them.

RECYCLED REFRIGERANTS. Refrigerants from which contaminants have been reduced by oil separation, removal of noncondensable gases, and single or multiple passes through devices that reduce moisture, acidity and particulate matter, such as replaceable core filter driers. These procedures usually are performed at the field job site or in a local service shop.

REFRIGERANT. A substance utilized to produce refrigeration by its expansion or vaporization.

REFRIGERANT SAFETY CLASSIFICATIONS. Groupings that indicate the toxicity and flammability classes in accordance with Section 1103.1. The classification group is made up of a letter (A or B) that indicates the toxicity class, followed by a number (1, 2 or 3) that indicates the flammability class. Refrigerant blends are similarly classified, based on the compositions at their worst cases of fractionation, as separately determined for toxicity and flammability. In some cases, the worst case of fractionation is the original formulation.

Flammability. See "Flammability classification."

Toxicity. See "Toxicity classification."

REFRIGERATING SYSTEM. A combination of interconnected refrigerant-containing parts constituting one closed refrigerant circuit in which a refrigerant is circulated for the purpose of extracting heat.

REFRIGERATION CAPACITY RATING. Expressed as 1 horsepower (0.75 kW), 1 ton or 12,000 Btu/h (3.5 kW), shall all mean the same quantity.

REFRIGERATION MACHINERY ROOM. See "*Machinery room*."

REFRIGERATION SYSTEM, ABSORPTION. A heat-operated, closed-refrigeration cycle in which a secondary fluid (the absorbent) absorbs a primary fluid (the refrigerant) that has been vaporized in the evaporator.

Direct system. A system in which the evaporator is in direct contact with the material or space refrigerated, or is located in air-circulating passages communicating with such spaces.

Indirect system. A system in which a brine coil cooled by the refrigerant is circulated to the material or space refrigerated, or is utilized to cool the air so circulated. Indirect systems are distinguished by the type or method of application.

REFRIGERATION SYSTEM CLASSIFICATION. Refrigeration systems are classified according to the degree of probability that leaked refrigerant from a failed connection, seal or component will enter an occupied area. The distinction is based on the basic design or location of the components.

REFRIGERATION SYSTEM, MECHANICAL. A combination of interconnected refrigeration-containing parts constituting one closed refrigerant circuit in which a refrigerant is circulated for the purpose of extracting heat and in which a compressor is used for compressing the refrigerant vapor.

REFRIGERATION SYSTEM, SELF-CONTAINED. A complete factory-assembled and tested system that is shipped in one or more sections and that does not have refrigerant-containing parts that are joined in the field by other than companion or block valves.

[A] REGISTERED DESIGN PROFESSIONAL. An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed.

[W] RELIEF AIR. Exhausted return air from a system that provides ventilation for human usage.

[W] REPLACEMENT AIR. Outdoor air that is used to replace air removed from a building through an exhaust system. Replacement air may be derived from one or more of the following: Makeup air, supply air, transfer air, and infiltration. However, the ultimate source of all replacement air is outdoor air. When replacement air exceeds exhaust, the result is exfiltration.

RETURN AIR. Air removed from an *approved* conditioned space or location and recirculated or exhausted.

RETURN AIR SYSTEM. An assembly of connected ducts, plenums, fittings, registers and grilles through which air from the space or spaces to be heated or cooled is conducted back to the supply unit (see also "Supply air system").

[FG] ROOM HEATER VENTED. A free-standing heating unit burning solid or liquid fuel for direct heating of the space in and adjacent to that in which the unit is located.

SAFETY VALVE. A valve that relieves pressure in a steam boiler by opening fully at the rated discharge pressure. The valve is of the spring-pop type.

SELF-CONTAINED EQUIPMENT. Complete, factory-assembled and tested, heating, air-conditioning or refrigeration *equipment* installed as a single unit, and having all working parts, complete with motive power, in an enclosed unit of said machinery.

[BF] SHAFT. An enclosed space extending through one or more stories of a building, connecting vertical openings in successive floors, or floors and the roof.

[BF] SHAFT ENCLOSURE. The walls or construction forming the boundaries of a shaft.

[A] SLEEPING UNIT. A room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Such rooms and spaces that are also part of a *dwelling unit* are not sleeping units.

[BF] SMOKE DAMPER. A *listed* device installed in ducts and air transfer openings designed to resist the passage of smoke. The device is installed to operate automatically, controlled by a smoke detection system, and where required, is capable of being positioned from a fire command center.

[BF] SMOKE-DEVELOPED INDEX. A numerical value assigned to a material tested in accordance with ASTM E84.

SOLAR THERMAL SYSTEM. A system that converts solar radiation to thermal energy for use in heating or cooling.

SOLID FUEL (COOKING APPLICATIONS). Applicable to commercial food service operations only, solid fuel is any bulk material such as hardwood, mesquite, charcoal or briquettes that is combusted to produce heat for cooking operations.

SOURCE CAPTURE SYSTEM. A mechanical exhaust system designed and constructed to capture air contaminants at their source and to exhaust such contaminants to the outdoor atmosphere.

[FG] STATIONARY FUEL CELL POWER PLANT. A self-contained package or factory-matched packages that constitute an automatically operated assembly of integrated systems for generating useful electrical energy and recoverable thermal energy that is permanently connected and fixed in place.

[S] ((~~STEAM HEATING BOILER.~~ ~~A boiler operated at pressures not exceeding 15 psi (103 kPa) for steam.~~))

STOP VALVE. A shutoff valve for controlling the flow of liquid or gases.

[BG] STORY. That portion of a building included between the upper surface of a floor and the upper surface of the floor next above, except that the topmost story shall be that portion of a building included between the upper surface of the topmost floor and the ceiling or roof above.

STRENGTH, ULTIMATE. The highest stress level that the component will tolerate without rupture.

SUPPLY AIR. That air delivered to each or any space supplied by the air distribution system or the total air delivered to all spaces supplied by the air distribution system, which is provided for ventilating, heating, cooling, humidification, dehumidification and other similar purposes.

SUPPLY AIR SYSTEM. An assembly of connected ducts, plenums, fittings, registers and grilles through which air, heated or cooled, is conducted from the supply unit to the space or spaces to be heated or cooled (see also "Return air system").

THEORETICAL AIR. The exact amount of air required to supply oxygen for complete *combustion* of a given quantity of a specific fuel.

THERMAL RESISTANCE (*R*). A measure of the ability to retard the flow of heat. The *R*-value is the reciprocal of thermal conductance.

[S] THIMBLE. A *listed* fitting designed to be installed in the opening in a masonry *chimney* through which the *chimney* connector passes.

[P] THIRD-PARTY CERTIFICATION AGENCY. An approved agency operating a product or material certification system that incorporates initial product testing, assessment and surveillance of a manufacturer's quality control system.

[P] THIRD-PARTY CERTIFIED. Certification obtained by the manufacturer indicating that the function and performance characteristics of a product or material have been determined by testing and ongoing surveillance by an approved third-party certification agency. Assertion of certification is in the form of identification in accordance with the requirements of the third-party certification agency.

[P] THIRD-PARTY TESTED. Procedure by which an approved testing laboratory provides documentation that a product, material or system conforms to specified requirements.

TLV-TWA (THRESHOLD LIMIT VALUE-TIME-WEIGHTED AVERAGE). The time-weighted average concentration of a refrigerant or other chemical in air for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers are repeatedly exposed, day after day, without adverse effects, as adopted by the American Conference of Government Industrial Hygienists (ACGIH).

TOILET ROOM. A room containing a water closet and, frequently, a lavatory, but not a bathtub, shower, spa or similar bathing fixture.

TOXICITY CLASSIFICATION. Refrigerants shall be classified for toxicity in one of two classes in accordance with ASHRAE 34:

Class A. Refrigerants that have an occupational exposure limit (OEL) of 400 parts per million (ppm) or greater.

Class B. Refrigerants that have an OEL of less than 400 ppm.

TRANSITION FITTINGS, PLASTIC TO STEEL. An adapter for joining plastic pipe to steel pipe. The purpose of this fitting is to provide a permanent, pressure-tight connection between two materials that cannot be joined directly one to another.

[S] UNCONFINED SPACE. A space having a volume not less than 50 cubic feet per 1,000 Btu/h (4.8m^3/kW) of the aggregate input rating of all fuel-burning appliances installed in that space. Rooms communicating directly with the space in which the appliances are installed, through openings not furnished with doors, are considered a part of the unconfined space.

[FG] UNIT HEATER. A self-contained *appliance* of the fan type, designed for the delivery of warm air directly into the space in which the *appliance* is located.

[S] UNSAFE. Constituting a fire or health hazard or otherwise dangerous to human life, constituting a hazard to safety, health or public welfare.

VENT. A pipe or other conduit composed of factory-made components, containing a passageway for conveying *combustion* products and air to the atmosphere, *listed* and *labeled* for use with a specific type or class of *appliance*.

Pellet vent. A vent *listed* and *labeled* for use with *listed* pellet-fuel-burning appliances.

Type L vent. A vent *listed* and *labeled* for use with the following:

1. Oil-burning appliances that are *listed* for use with Type L vents.
2. Gas-fired appliances that are *listed* for use with Type B vents.

VENT CONNECTOR. The pipe that connects an *approved* fuel-fired *appliance* to a vent.

VENT DAMPER DEVICE, AUTOMATIC. A device intended for installation in the venting system, in the outlet of an individual automatically operated fuel-burning *appliance* that is designed to open the venting system automatically when the *appliance* is in operation and to close off the venting system automatically when the *appliance* is in a standby or shutdown condition.

VENTILATION. The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, any space.

VENTILATION AIR. That portion of supply air that comes from the outside (outdoors), plus any recirculated air that has been treated to maintain the desired quality of air within a designated space.

[W] VENTILATION ZONE. Any indoor area that requires ventilation and comprises one or more spaces with the same occupancy category (see Table 403.3.1.1), occupant density, zone air distribution effectiveness (see Section 403.3.1.1.1.2), and design zone primary airflow per unit area.

[FG] VENTING SYSTEM. A continuous open passageway from the flue collar of an *appliance* to the outdoor atmosphere for the purpose of removing flue or vent gases. A venting system is usually composed of a vent or a *chimney* and vent connector, if used, assembled to form the open passageway.

WATER HEATER. Any heating *appliance* or *equipment* that heats potable water and supplies such water to the potable hot water distribution system, and includes only those appliances that do not exceed pressure of 160 pounds per square inch (1103 kPa), volume of 120 gallons (454 L) and a heat input of 200,000 Btu/hr (58.6 kW). Appliances and *equipment* that exceed these values are classified as boilers.

[W] WHOLE HOUSE VENTILATION SYSTEM. A mechanical ventilation system, including fans, controls, and ducts, which replaces by direct means, air from the habitable rooms with outdoor air.

ZONE. One *occupiable space* or several occupiable spaces with similar *occupancy* classification (see Table 403.3.1.1), occupant density, zone air distribution effectiveness and zone primary airflow rate per unit area.

CHAPTER 3

GENERAL REGULATIONS

User note:

About this chapter: *Chapter 3 contains broadly applicable requirements that are necessarily placed in an overarching "general" chapter. These general requirements would not be suitably located in any other chapter that is specific to unique subject matter. General requirements include those related to installation, access, location, testing, structural and clearances.*

SECTION 301
GENERAL

[S] 301.1 Scope. This chapter shall govern the approval and installation of all *equipment* and appliances that comprise parts of the building mechanical systems regulated by this code in accordance with Section ((~~101.2~~)) 103.1.

Note: Seattle Energy Code Section C403.1.4 restricts the use of electric resistance and fossil fuel-fired equipment for HVAC heating in most buildings, and Section C404.2.3 restricts the use of electric resistance and fossil fuel-fired service water heating equipment in Group R-1 and R-2 buildings.

301.2 Energy utilization. Heating, ventilating and air-conditioning systems of all structures shall be designed and installed for efficient utilization of energy in accordance with the *International Energy Conservation Code*.

301.3 Identification. Each length of pipe and tubing and each pipe fitting utilized in a mechanical system shall bear the identification of the manufacturer.

301.4 Plastic pipe, fittings and components. Plastic pipe, fittings and components shall be *third-party certified* as conforming to NSF 14.

301.5 Third-party testing and certification. Piping, tubing and fittings shall comply with the applicable referenced standards, specifications and performance criteria of this code and shall be identified in accordance with Section 301.3. Piping, tubing and fittings shall either be tested by an approved third-party testing agency or certified by an approved *third-party certification agency*.

301.6 Fuel gas appliances and equipment. The approval and installation of fuel gas distribution piping and *equipment*, fuel gas-fired appliances and fuel gas-fired *appliance* venting systems shall be in accordance with the *International Fuel Gas Code*.

[S] 301.7 Listed and labeled. Appliances regulated by this code shall be *listed* and *labeled* for the application in which they are installed and used, unless otherwise *approved* in accordance with Section 105 or 106.

Exception: Listing and labeling of *equipment* and appliances used for refrigeration shall be in accordance with Section 1101.2.

301.8 Labeling. Labeling shall be in accordance with the procedures set forth in Sections 301.8.1 through 301.8.2.3.

301.8.1 Testing. An *approved* agency shall test a representative sample of the mechanical *equipment* and appliances being *labeled* to the relevant standard or standards. The *approved* agency shall maintain a record of all of the tests performed. The record shall provide sufficient detail to verify compliance with the test standard.

301.8.2 Inspection and identification. The *approved* agency shall periodically perform an inspection, which shall be in-plant if necessary, of the mechanical *equipment* and appliances to be *labeled*. The inspection shall verify that the *labeled* mechanical *equipment* and appliances are representative of the mechanical *equipment* and appliances tested.

301.8.2.1 Independent. The agency to be *approved* shall be objective and competent. To confirm its objectivity, the agency shall disclose all possible conflicts of interest.

301.8.2.2 Equipment. An *approved* agency shall have adequate *equipment* to perform all required tests. The *equipment* shall be periodically calibrated.

301.8.2.3 Personnel. An *approved* agency shall employ experienced personnel educated in conducting, supervising and evaluating tests.

301.9 Label information. A permanent factory-applied nameplate(s) shall be affixed to appliances on which shall appear in legible lettering, the manufacturer's name or trademark, the model number, serial number and the seal or mark of the *approved* agency. A label shall include the following:

1. Electrical *equipment* and appliances: Electrical rating in volts, amperes and motor phase; identification of individual electrical components in volts, amperes or watts, motor phase; Btu/h (W) output; and required clearances.
2. Absorption units: Hourly rating in Btu/h (W); minimum hourly rating for units having step or automatic modulating controls; type of fuel; type of refrigerant; cooling capacity in Btu/h (W); and required clearances.

3. Fuel-burning units: Hourly rating in Btu/h (W); type of fuel *approved* for use with the *appliance*; and required clearances.
4. Electric comfort heating appliances: electric rating in volts, amperes and phase; Btu/h (W) output rating; individual marking for each electrical component in amperes or watts, volts and phase; and required clearances from combustibles.

[S] 301.10 Electrical. Electrical wiring, controls and connections to *equipment* and appliances regulated by this code shall be in accordance with ((~~NFPA 70~~)) the *Seattle Electrical Code*.

[S] 301.11 Plumbing connections. Potable water supply and building drainage system connections to *equipment* and appliances regulated by this code shall be in accordance with the ((~~*International*~~)) *Uniform Plumbing Code*.

301.12 Fuel types. Fuel-fired appliances shall be designed for use with the type of fuel to which they will be connected and the altitude at which they are installed. Appliances that comprise parts of the building mechanical system shall not be converted for the usage of a different fuel, except where *approved* and converted in accordance with the manufacturer's instructions. The fuel input rate shall not be increased or decreased beyond the limit rating for the altitude at which the *appliance* is installed.

301.13 Vibration isolation. Where vibration isolation of *equipment* and appliances is employed, an *approved* means of supplemental restraint shall be used to accomplish the support and restraint.

301.14 Repair. Defective material or parts shall be replaced or repaired in such a manner so as to preserve the original approval or listing.

301.15 Wind resistance. Mechanical *equipment*, appliances and supports that are exposed to wind shall be designed and installed to resist the wind pressures determined in accordance with the *International Building Code*.

[BS] 301.16 Flood hazard. For structures located in flood hazard areas, mechanical systems, equipment and appliances shall be located at or above the elevation required by Section 1612 of the *International Building Code* for utilities and attendant equipment.

Exception: Mechanical systems, equipment and appliances are permitted to be located below the elevation required by Section 1612 of the of the *International Building Code* for utilities and attendant equipment provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.

[BS] 301.16.1 Coastal high-hazard areas and coastal A zones. In coastal high-hazard areas and coastal A zones, mechanical systems and *equipment* shall not be mounted on or penetrate walls intended to break away under flood loads.

301.17 Rodentproofing. Buildings or structures and the walls enclosing habitable or occupiable rooms and spaces in which persons live, sleep or work, or in which feed, food or foodstuffs are stored, prepared, processed, served or sold, shall be constructed to protect against the entrance of rodents in accordance with the *International Building Code*.

301.18 Seismic resistance. Where earthquake loads are applicable in accordance with the *International Building Code*, mechanical system supports shall be designed and installed for the seismic forces in accordance with the *International Building Code*.

SECTION 302
PROTECTION OF STRUCTURE

302.1 Structural safety. The building or structure shall not be weakened by the installation of mechanical systems. Where floors, walls, ceilings or any other portion of the building or structure are required to be altered or replaced in the process of installing or repairing any system, the building or structure shall be left in a safe structural condition in accordance with the *International Building Code*.

302.2 Penetrations of floor/ceiling assemblies and fire-resistance-rated assemblies. Penetrations of floor/ceiling assemblies and assemblies required to have a fire-resistance rating shall be protected in accordance with Chapter 7 of the *International Building Code*.

[BS] 302.3 Cutting, notching and boring in wood framing. The cutting, notching and boring of wood framing members shall comply with Sections 302.3.1 through 302.3.4.

[BS] 302.3.1 Joist notching. Notches on the ends of joists shall not exceed one-fourth the joist depth. Holes bored in joists shall not be within 2 inches (51 mm) of the top or bottom of the joist, and the diameter of any such hole shall not exceed one-third the depth of the joist. Notches in the top or bottom of joists shall not exceed one-sixth the depth and shall not be located in the middle third of the span.

[BS] 302.3.2 Stud cutting and notching. In exterior walls and bearing partitions, a wood stud shall not be cut or notched in excess of 25 percent of its depth. In nonbearing partitions that do not support loads other than the weight of the partition, a stud shall not be cut or notched in excess of 40 percent of its depth.

[BS] 302.3.3 Bored holes. The diameter of bored holes in wood studs shall not exceed 40 percent of the stud depth. The diameter of bored holes in wood studs shall not exceed 60 percent of the stud depth in nonbearing partitions. The diameter of bored holes in wood studs shall not exceed 60 percent of the stud depth in any wall where each stud is doubled, provided that

not more than two such successive doubled studs are so bored. The edge of the bored hole shall be not closer than 5/8 inch (15.9 mm) to the edge of the stud. Bored holes shall be not located at the same section of stud as a cut or notch.

[BS] 302.3.4 Engineered wood products. Cuts, notches and holes bored in trusses, structural composite lumber, structural glue-laminated members and I-joists are prohibited except where permitted by the manufacturer's recommendations or where the effects of such alterations are specifically considered in the design of the member by a registered design professional.

[BS] 302.4 Alterations to trusses. Truss members and components shall not be cut, drilled, notched, spliced or otherwise altered in any way without written concurrence and approval of a *registered design professional*. Alterations resulting in the addition of loads to any member, such as HVAC *equipment* and water heaters, shall not be permitted without verification that the truss is capable of supporting such additional loading.

[BS] 302.5 Cutting, notching and boring in steel framing. The cutting, notching and boring of steel framing members shall comply with Sections 302.5.1 through 302.5.3.

[BS] 302.5.1 Cutting, notching and boring holes in structural steel framing. The cutting, notching and boring of holes in structural steel framing members shall be as prescribed by the *registered design professional*.

[BS] 302.5.2 Cutting, notching and boring holes in cold-formed steel framing. Flanges and lips of load-bearing cold-formed steel framing members shall not be cut or notched. Holes in webs of load-bearing cold-formed steel framing members shall be permitted along the centerline of the web of the framing member and shall not exceed the dimensional limitations, penetration spacing or minimum hole edge distance as prescribed by the *registered design professional*. Cutting, notching and boring holes of steel floor/roof decking shall be as prescribed by the *registered design professional*.

[BS] 302.5.3 Cutting, notching and boring holes in nonstructural cold-formed steel wall framing. Flanges and lips of nonstructural cold-formed steel wall studs shall not be cut or notched. Holes in webs of nonstructural cold-formed steel wall studs shall be permitted along the centerline of the web of the framing member, shall not exceed 1-1/2 inches (38 mm) in width or 4 inches (102 mm) in length, and shall not be spaced less than 24 inches (610 mm) center to center from another hole or less than 10 inches (254 mm) from the bearing end.

SECTION 303
EQUIPMENT AND APPLIANCE LOCATION

303.1 General. *Equipment* and appliances shall be located as required by this section, specific requirements elsewhere in this code and the conditions of the *equipment* and *appliance* listing.

303.2 Hazardous locations. Appliances shall not be located in a *hazardous location* unless *listed* and *approved* for the specific installation.

303.3 Prohibited locations. Fuel-fired appliances shall not be located in, or obtain *combustion* air from, any of the following rooms or spaces:

1. Sleeping rooms.
2. Bathrooms.
3. Toilet rooms.
4. Storage closets.
5. Surgical rooms.

Exception: This section shall not apply to the following appliances:

1. *Direct-vent* appliances that obtain all *combustion* air directly from the outdoors.
2. Solid fuel-fired appliances, provided that combustion air is provided in accordance with the manufacturers' instructions.
3. Appliances installed in a dedicated enclosure in which all *combustion* air is taken directly from the outdoors, in accordance with Chapter 7. *Access* to such enclosure shall be through a solid door, weather-stripped in accordance with the exterior door air leakage requirements of the *International Energy Conservation Code* and equipped with an *approved* self-closing device.

303.4 Protection from damage. Appliances shall not be installed in a location where subject to mechanical damage unless protected by *approved* barriers.

303.5 Indoor locations. Furnaces and boilers installed in closets and alcoves shall be listed for such installation.

303.6 Outdoor locations. Appliances installed in other than indoor locations shall be *listed* and *labeled* for outdoor installation.

[S] 303.7 Pit locations. Appliances installed in pits or excavations shall not come in direct contact with the surrounding soil and shall be installed not less than 3 inches (76 mm) above the pit floor. The sides of the pit or excavation shall be held back not less than 12 inches (305 mm) from the *appliance*, and a minimum of 30 inches (762 mm) on the control side. Where the depth exceeds 12 inches (305 mm) below adjoining grade, the walls of the pit or excavation shall be lined with concrete or masonry. Such concrete or masonry shall extend not less than 4 inches (102 mm) above adjoining grade and shall have sufficient lateral

load-bearing capacity to resist collapse. Excavation on the control side of the appliance shall extend not less than 30 inches (762 mm) horizontally. The *appliance* shall be protected from flooding in an *approved* manner.

[S][BF] 303.8 ((~~Elevator shafts~~)) Installation of pipes or ducts conveying gases, vapors or liquids in hoistways, machine rooms, or machinery spaces for elevators. ((~~Mechanical systems shall not be located in an elevator shaft.~~)) Pipes and ducts conveying gases, vapors or liquids shall not be installed in elevator hoistways, elevator machine rooms, and elevator machinery spaces.

Exceptions:

1. Only ducts for heating, cooling, ventilating, and venting these spaces are permitted to be installed in the hoistway, machine room, and machinery space.
2. Ducts and electrical conduit may pass through an elevator machine room or machinery space if they are separated from the room or space by construction equal to the rated construction of the room or space and located so that all required *clearances* are maintained.

   If a vented machine room is not vented directly to the outside of the building, the vent shall be enclosed within a fire barrier with at least a one-hour fire-resistance rating, or as required for a shaft where it passes through occupied floors.
3. Standard sprinkler protection conforming to the requirements of NFPA 13 is permitted to be installed in these spaces, subject to rules promulgated by the code official.
4. Subject to the approval of the code official, pipes that are protected with double containment whose joints are threaded, soldered or welded joints are permitted. Pipes shall not be located less than 7 feet above the floor in machine rooms.

303.9 Fireplaces in Group I-2, Condition 2 occupancies. Fuel-burning appliances and fireplaces in Group I-2, Condition 2 occupancies shall be in accordance with Section 901.4.

[S][B] 303.10 Interior exit stairways and exit passageways. Mechanical systems shall not be located in *interior exit stairways* and ramps and *exit passageways*. Penetrations into and openings through *interior exit stairways* and ramps and *exit passageways* are prohibited except for:

1. *Equipment* allowed or required by the International Building Code to serve the *interior exit stairway* and *exit passageways* such as:
   - 1.1 Ductwork and *equipment* necessary for independent ventilation or stairway pressurization,
   - 1.2 Sprinkler piping,
   - 1.3 Standpipes,
   - 1.4 Electrical raceway serving the *interior exit stairway* or ramp terminating in a steel box not exceeding 16 square inches (10 323 mm^2) in area, and
   - 1.5 Piping used exclusively for the drainage of rainfall runoff from roof areas provided the roof is not used for a helistop or heliport.
2. Unfired heaters allowed by the *International Building Code* for freeze protection of fire protection *equipment* may penetrate one protective membrane. The conduit serving the heater may penetrate both protective membranes. Such penetrations shall be protected in accordance with *International Building Code* Section 714. There shall be no penetrations or communicating openings, whether protected or not, between adjacent *interior exit stairways* and ramps.

   Exception: Membrane penetrations shall be permitted on the outside of the *interior exit stairway* and ramp. Such penetrations shall be protected in accordance with *International Building Code* Section 714.4.4.2.

Interpretation: Ducts passing through *interior exit stairways* shall be separated from the stairway by construction having a fire-resistance rating at least equal to the stairway walls. At least one side of the duct enclosure shall abut the *interior exit stairway* enclosure.

SECTION 304
INSTALLATION

304.1 General. *Equipment* and appliances shall be installed as required by the terms of their approval, in accordance with the conditions of the listing, the manufacturer's installation instructions and this code. Manufacturer's installation instructions shall be available on the job site at the time of inspection.

304.2 Conflicts. Where conflicts between this code and the conditions of listing or the manufacturer's installation instructions occur, the provisions of this code shall apply.

Exception: Where a code provision is less restrictive than the conditions of the listing of the *equipment* or *appliance* or the manufacturer's installation instructions, the conditions of the listing and the manufacturer's installation instructions shall apply.

304.3 Elevation of ignition source. Equipment and appliances having an *ignition source* and located in hazardous locations and public garages, private garages, repair garages, automotive motor fuel-dispensing facilities and parking garages shall be elevated such that the source of ignition is not less than 18 inches (457 mm) above the floor surface on which the *equipment* or *appliance* rests. For the purpose of this section, rooms or spaces that are not part of the living space of a *dwelling unit* and that communicate directly with a private garage through openings shall be considered to be part of the private garage.

Exception: Elevation of the ignition source is not required for appliances that are listed as flammable vapor ignition resistant.

[S] 304.3.1 Parking garages. Connection of a parking garage with any room in which there is a fuel-fired *appliance* shall be by means of a vestibule providing a two-doorway separation, except that a single door is permitted where the sources of ignition in the *appliance* are elevated in accordance with Section 304.3.

Exception: This section shall not apply to *appliance* installations complying with Section 304.6 <u>or to *equipment* having an internal *combustion* engine</u>.

304.4 Prohibited equipment and appliance location. Equipment and appliances having an *ignition source* shall not be installed in Group H occupancies or control areas where open use, handling or dispensing of combustible, flammable or explosive materials occurs.

[FG] 304.5 Hydrogen-generating and refueling operations. Hydrogen-generating and refueling appliances shall be installed and located in accordance with their listing and the manufacturer's instructions. Ventilation shall be required in accordance with Section 304.5.1, 304.5.2 or 304.5.3 in public garages, private garages, repair garages, automotive motor fuel-dispensing facilities and parking garages that contain hydrogen-generating appliances or refueling systems. For the purpose of this section, rooms or spaces that are not part of the living space of a *dwelling unit* and that communicate directly with a private garage through openings shall be considered to be part of the private garage.

[FG] 304.5.1 Natural ventilation. Indoor locations intended for hydrogen-generating or refueling operations shall be limited to a maximum floor area of 850 square feet (79 m^2) and shall communicate with the outdoors in accordance with Sections 304.5.1.1 and 304.5.1.2. The maximum rated output capacity of hydrogen-generating appliances shall not exceed 4 standard cubic feet per minute (0.00189 m^3/s) of hydrogen for each 250 square feet (23 m^2) of floor area in such spaces. The minimum cross-sectional dimension of air openings shall be 3 inches (76 mm). Where ducts are used, they shall be of the same cross-sectional area as the free area of the openings to which they connect. In such locations, *equipment* and appliances having an *ignition source* shall be located such that the source of ignition is not within 12 inches (305 mm) of the ceiling.

[FG] 304.5.1.1 Two openings. Two permanent openings shall be provided within the garage. The upper opening shall be located entirely within 12 inches (305 mm) of the ceiling of the garage. The lower opening shall be located entirely within 12 inches (305 mm) of the floor of the garage. Both openings shall be provided in the same exterior wall. The openings shall communicate directly with the outdoors and shall have a minimum free area of 1/2 square foot per 1,000 cubic feet (1 m^2/610 m^3) of garage volume.

[FG] 304.5.1.2 Louvers and grilles. In calculating free area required by Section 304.5.1, the required size of openings shall be based on the net free area of each opening. If the free area through a design of louver or grille is known, it shall be used in calculating the size opening required to provide the free area specified. If the design and free area are not known, it shall be assumed that wood louvers will have 25-percent free area and metal louvers and grilles will have 75-percent free area. Louvers and grilles shall be fixed in the open position.

[FG] 304.5.2 Mechanical ventilation. Indoor locations intended for hydrogen-generating or refueling operations shall be ventilated in accordance with Section 502.16. In such locations, *equipment* and appliances having an *ignition source* shall be located such that the source of ignition is below the mechanical ventilation outlet(s).

[FG] 304.5.3 Specially engineered installations. As an alternative to the provisions of Sections 304.5.1 and 304.5.2, the necessary supply of air for ventilation and dilution of flammable gases shall be provided by an *approved* engineered system.

304.6 Public garages. Appliances located in public garages, motor fueling-dispensing facilities, repair garages or other areas frequented by motor vehicles, shall be installed not less than 8 feet (2438 mm) above the floor. Where motor vehicles are capable of passing under an *appliance*, the *appliance* shall be installed at the clearances required by the *appliance* manufacturer and not less than 1 foot (305 mm) higher than the tallest vehicle garage door opening.

Exception: The requirements of this section shall not apply where the appliances are protected from motor vehicle impact and installed in accordance with Section 304.3 and NFPA 30A.

304.7 Private garages. Appliances located in private garages and carports shall be installed with a minimum clearance of 6 feet (1829 mm) above the floor.

Exception: The requirements of this section shall not apply where the appliances are protected from motor vehicle impact and installed in accordance with Section 304.3.

304.8 Construction and protection. Boiler rooms and furnace rooms shall be protected as required by the *International Building Code.*

304.9 Clearances to combustible construction. Heat-producing *equipment* and *appliances* shall be installed to maintain the required *clearances* to combustible construction as specified in the listing and manufacturer's instructions. Such clearances shall be reduced only in accordance with Section 308. *Clearances* to combustibles shall include such considerations as door swing, drawer pull, overhead projections or shelving and window swing, shutters, coverings and drapes. Devices such as doorstops or limits, closers, drapery ties or guards shall not be used to provide the required *clearances*.

304.10 Clearances from grade. Equipment and *appliances* installed at grade level shall be supported on a level concrete slab or other *approved* material extending not less than 3 inches (76 mm) above adjoining grade or shall be suspended not less than 6 inches (152 mm) above adjoining grade. Such support shall be in accordance with the manufacturer's installation instructions.

[BE] 304.11 Guards. Guards shall be provided where various components that require service and roof hatch openings are located within 10 feet (3048 mm) of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches (762 mm) above the floor, roof, or grade below. The guard shall extend not less than 30 inches (762 mm) beyond each end of components that require service. The top of the guard shall be located not less than 42 inches (1067 mm) above the elevated surface adjacent to the guard. The guard shall be constructed so as to prevent the passage of a 21-inch-diameter (533 mm) sphere and shall comply with the loading requirements for guards specified in the *International Building Code*.

Exception: Guards are not required where fall arrest/restraint anchorage connector devices that comply with ANSI/ASSE Z 359.1 are installed.

304.12 Area served. Appliances serving different areas of a building other than where they are installed shall be permanently marked in an *approved* manner that uniquely identifies the *appliance* and the area it serves.

[S] 304.13 Clearances and encroachments in the public right-of-way. All encroachments of *equipment* and appliances on, over or under sidewalks, streets, alleys and other public places are subject to approval by the Director of Transportation and the *code official*. Encroachments shall comply with this code and other codes as determined by the Director of Transportation and the *code official.*

Note: The Seattle Department of Transportation (SDOT) publishes the "Seattle Right-of-Way Improvements Manual" that contains detailed information on *clearances* (subsection 3.3, Clearances), and required SDOT street use permits (Chapter 4). SDOT discourages encroachments into the public right-of-way by mechanical *equipment.*

SECTION 305
PIPING SUPPORT

305.1 General. Mechanical system piping shall be supported in accordance with this section.

305.2 Materials. Pipe hangers and supports shall have sufficient strength to withstand all anticipated static and specified dynamic loading conditions associated with the intended use. Pipe hangers and supports that are in direct contact with piping shall be of *approved* materials that are compatible with the piping and that will not promote galvanic action.

305.3 Structural attachment. Hangers and anchors shall be attached to the building construction in an *approved* manner.

305.4 Interval of support. Piping shall be supported at distances not exceeding the spacing specified in Table 305.4, or in accordance with ANSI/MSS SP-58.

appliance. The clear access opening dimensions shall be not less than 20 inches by 30 inches (508 mm by 762 mm), and large enough to allow removal of the largest *appliance*.

Exceptions:

1. The passageway and level service space are not required where the *appliance* is capable of being serviced and removed through the required opening.
2. Where the passageway is unobstructed and not less than 6 feet (1829 mm) high and 22 inches (559 mm) wide for its entire length, the passageway shall be not greater than 50 feet (15 250 mm) in length.

[S] 306.3.1 Electrical requirements. A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be provided at or near the *appliance* location in accordance with ((~~NFPA 70~~)) the *Seattle Electrical Code*.

306.4 Appliances under floors. Underfloor spaces containing appliances shall be provided with an access opening and unobstructed passageway large enough to remove the largest *appliance*. The passageway shall be not less than 30 inches (762 mm) high and 22 inches (559 mm) wide, nor more than 20 feet (6096 mm) in length measured along the centerline of the passageway from the opening to the *appliance*. A level service space not less than 30 inches (762 mm) deep and 30 inches (762 mm) wide shall be present at the front or service side of the *appliance*. If the depth of the passageway or the service space exceeds 12 inches (305 mm) below the adjoining grade, the walls of the passageway shall be lined with concrete or masonry. Such concrete or masonry shall extend not less than 4 inches (102 mm) above the adjoining grade and shall have sufficient lateral-bearing capacity to resist collapse. The clear access opening dimensions shall be not less than 22 inches by 30 inches (559 mm by 762 mm), and large enough to allow removal of the largest *appliance*.

Exceptions:

1. The passageway is not required where the level service space is present when the access is open and the *appliance* is capable of being serviced and removed through the required opening.
2. Where the passageway is unobstructed and not less than 6 feet high (1929 mm) and 22 inches (559 mm) wide for its entire length, the passageway shall not be limited in length.

[S] 306.4.1 Electrical requirements. A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be provided at or near the *appliance* location in accordance with ((~~NFPA 70~~)) the *Seattle Electrical Code*.

[W][S] 306.5 Equipment and appliances on roofs or elevated structures. Where *equipment* or appliances requiring access ((~~or appliances~~)) are located on an elevated structure or the roof of a building such that personnel will have to climb higher than 16 feet (4877 mm) above grade to access such equipment or appliances, an interior or exterior means of access shall be provided. Such access shall not require climbing over obstructions greater than 30 inches (762 mm) in height or walking on roofs having a slope greater than four units vertical in 12 units horizontal (33-percent slope). Such access shall not require the use of portable ladders. Where access involves climbing over parapet walls, the height shall be measured to the top of the parapet wall.

Permanent ladders installed to provide the required access shall comply with the following minimum design criteria:

1. The side railing shall extend above the parapet or roof edge not less than ((~~30~~)) 42 inches (((~~762~~)) 1067 mm).
2. Ladders shall have rung spacing not to exceed ((~~14~~)) 12 inches (((~~356~~)) 305 mm) on center. The uppermost rung shall be not greater than 24 inches (610 mm) below the upper edge of the roof hatch, roof or parapet, as applicable.
3. Ladders shall have a toe spacing not less than ((~~6~~)) 7 inches (((~~152~~)) 178 mm) deep.
4. There shall be not less than 18 inches (457 mm) between rails.
5. Rungs shall have a diameter not less than 0.75-inch (19.1 mm) and be capable of withstanding a 300-pound (136 kg) load.
6. Ladders over 30 feet (9144 mm) in height shall be provided with offset sections and landings capable of withstanding 100 pounds per square foot (488 kg/m^2). Landing dimensions shall be not less than 18 inches (457 mm) and not less than the width of the ladder served. A guard rail shall be provided on all open sides of the landing.
7. Climbing clearance. The distance from the centerline of the rungs to the nearest permanent object on the climbing side of the ladder shall be not less than 30 inches (762 mm) measured perpendicular to the rungs. This distance shall be maintained from the point of ladder access to the bottom of the roof hatch. A minimum clear width of 15 inches (381 mm) shall be provided on both sides of the ladder measured from the midpoint of and parallel with the rungs except where cages or wells are installed.
8. Landing required. The ladder shall be provided with a clear and unobstructed bottom landing area having a minimum dimension of 30 inches (762 mm) by 30 inches (762 mm) centered in front of the ladder.
9. Ladders shall be protected against corrosion by *approved* means.
10. Access to ladders shall be provided at all times.

Catwalks installed to provide the required access shall be not less than 24 inches (610 mm) wide and shall have railings as required for service platforms.

Exception: This section shall not apply to Group R-3 occupancies.

Interpretation I306.5: Item 10 allows access to ladders to be restricted to authorized personnel and prohibits storage that blocks or restricts access to the ladder.

306.5.1 Sloped roofs. Where appliances, *equipment*, fans or other components that require service are installed on a roof having a slope of three units vertical in 12 units horizontal (25-percent slope) or greater and having an edge more than 30 inches (762 mm) above grade at such edge, a level platform shall be provided on each side of the *appliance* or *equipment* to which access is required for service, repair or maintenance. The platform shall be not less than 30 inches (762 mm) in any dimension and shall be provided with guards. The guards shall extend not less than 42 inches (1067 mm) above the platform, shall be constructed so as to prevent the passage of a 21-inch-diameter (533 mm) sphere and shall comply with the loading requirements for guards specified in the *International Building Code*. Access shall not require walking on roofs having a slope greater than four units vertical in 12 units horizontal (33-percent slope). Where access involves obstructions greater than 30 inches (762 mm) in height, such obstructions shall be provided with ladders installed in accordance with Section 306.5 or stairways installed in accordance with the requirements specified in the *International Building Code* in the path of travel to and from appliances, fans or *equipment* requiring service.

[S] 306.5.2 Electrical requirements. A receptacle outlet shall be provided at or near the *equipment* location in accordance with ((~~NFPA 70~~)) the *Seattle Electrical Code*.

[W][S] 306.6 Appliances above ceilings. Appliances that are located above the ceiling shall have ready access for inspection, service and repair without removing permanent construction. Appliances shall be provided with ready access to panel or removable ceiling tile with minimum nominal dimensions of 24 inches by 24 inches (609 mm x 609 mm). The appliance is not required to be removable or replaceable through the access panel or removable ceiling tile. The appliance may be removed or replaced by removing the ceiling or wall assemblies adjacent to the appliance as long as they are not permanent construction.

Exceptions:

1. This section shall not apply to replacement appliances installed in existing compartments and alcoves where the working space clearances are in accordance with the equipment or appliance manufacturer's installation instructions.
2. A smaller access panel or removable ceiling tile shall be permitted when allowed by the equipment or appliance manufacturer's installation instructions.

SECTION 307
CONDENSATE DISPOSAL

[S] 307.1 Fuel-burning appliances. Liquid *combustion* by-products of condensing appliances shall be collected, pH neutralized and discharged to an *approved* plumbing fixture or disposal area in accordance with the manufacturer's installation instructions. Condensate piping shall be of *approved* corrosion-resistant material and shall not be smaller than the drain connection on the appliance. Such piping shall maintain a minimum horizontal slope in the direction of discharge of not less than one-eighth unit vertical in 12 units horizontal (1-percent slope).

307.2 Evaporators and cooling coils. Condensate drain systems shall be provided for *equipment* and appliances containing evaporators or cooling coils. Condensate drain systems shall be designed, constructed and installed in accordance with Sections 307.2.1 through 307.2.5.

Exception: Evaporators and cooling coils that are designed to operate in sensible cooling only and not support condensation shall not be required to meet the requirements of this section.

307.2.1 Condensate disposal. Condensate from all cooling coils and evaporators shall be conveyed from the drain pan outlet to an *approved* place of disposal. Such piping shall maintain a minimum horizontal slope in the direction of discharge of not less than one-eighth unit vertical in 12 units horizontal (1-percent slope). Condensate shall not discharge into a street, alley or other areas so as to cause a nuisance.

307.2.2 Drain pipe materials and sizes. Components of the condensate disposal system shall be cast iron, galvanized steel, copper, copper alloy, cross-linked polyethylene, polyethylene, ABS, CPVC, PVC, or polypropylene pipe or tubing. Components shall be selected for the pressure and temperature rating of the installation. Joints and connections shall be made in accordance with the applicable provisions of ((~~Chapter 7 of~~)) the ((~~*International*~~)) *Uniform Plumbing Code* relative to the material type. Condensate waste and drain line size shall be not less than 3/4-inch internal diameter and shall not decrease in size from the drain pan connection to the place of condensate disposal. Where the drain pipes from more than one unit are manifolded together for condensate drainage, the pipe or tubing shall be sized in accordance with Table 307.2.2.

TABLE 307.2.2
CONDENSATE DRAIN SIZING

EQUIPMENT CAPACITY	MINIMUM CONDENSATE PIPE DIAMETER
Up to 20 tons of refrigeration	3/4 inch
Over 20 tons to 40 tons of refrigeration	1 inch
Over 40 tons to 90 tons of refrigeration	1-1/4 inch
Over 90 tons to 125 tons of refrigeration	1-1/2 inch
Over 125 tons to 250 tons of refrigeration	2 inch

1 inch = 25.4 mm, 1 ton = 3.517 kW.

[W] 307.2.3 Auxiliary and secondary drain systems. In addition to the requirements of Section 307.2.1, where damage to any building components could occur as a result of overflow from the *equipment* primary condensate removal system, one of the following auxiliary protection methods shall be provided for each cooling coil or fuel-fired *appliance* that produces condensate:

1. An auxiliary drain pan with a separate drain shall be provided under the coils on which condensation will occur. The auxiliary pan drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The pan shall have a minimum depth of 1-1/2 inches (38 mm), shall be not less than 3 inches (76 mm) larger than the unit, or the coil dimensions in width and length and shall be constructed of corrosion-resistant material. Galvanized sheet steel pans shall have a minimum thickness of not less than 0.0236 inch (0.6010 mm) (No. 24 gage). Nonmetallic pans shall have a minimum thickness of not less than 0.0625 inch (1.6 mm).
2. A separate overflow drain line shall be connected to the drain pan provided with the *equipment*. Such overflow drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The overflow drain line shall connect to the drain pan at a higher level than the primary drain connection.
3. An auxiliary drain pan without a separate drain line shall be provided under the coils on which condensate will occur. Such pan shall be equipped with a water-level detection device conforming to UL 508 that will shut off the *equipment* served prior to overflow of the pan. The auxiliary drain pan shall be constructed in accordance with Item 1 of this section.
4. A water-level detection device conforming to UL 508 shall be provided that will shut off the *equipment* served in the event that the primary drain is blocked. The device shall be installed in the primary drain line, the overflow drain line, or in the equipment-supplied drain pan, located at a point higher than the primary drain line connection and below the overflow rim of such pan.

Exceptions:

1. Fuel-fired appliances that automatically shut down operation in the event of a stoppage in the condensate drainage system.
2. Unducted fan coil units where there is no factory option available for water-level detection devices and which are installed directly within the occupied space.

[S] 307.2.3.1 Water-level monitoring devices. On downflow units and all other coils that do not have a secondary drain or provisions to install a secondary or auxiliary drain pan, a water-level monitoring device shall be installed inside the primary drain pan. This device shall shut off the *equipment* served in the event that the primary drain becomes restricted. Devices installed in the drain line shall not be permitted.

Exception: Water-level monitoring devices are not required for unducted fan coil units where there is no factory option available for water-level detection devices and the units are installed directly within the occupied space.

307.2.3.2 Appliance, equipment and insulation in pans. Where appliances, *equipment* or insulation are subject to water damage when auxiliary drain pans fill, that portion of the *appliance*, *equipment* and insulation shall be installed above the rim of the pan. Supports located inside of the pan to support the *appliance* or *equipment* shall be water resistant and *approved*.

307.2.4 Traps. Condensate drains shall be trapped as required by the *equipment* or *appliance* manufacturer.

[W] 307.2.4.1 Ductless mini-split system traps. Ductless mini-split equipment that produces condensate shall be provided with an inline check valve located in the drain line, ((~~or~~)) a trap, or other means of condensate drainage in accordance with the manufacturer's instructions.

307.2.5 Drain line maintenance. Condensate drain lines shall be configured to permit the clearing of blockages and performance of maintenance without requiring the drain line to be cut.

307.3 Condensate pumps. Condensate pumps located in uninhabitable spaces, such as attics and crawl spaces, shall be connected to the appliance or equipment served such that when the pump fails, the appliance or equipment will be prevented from operating. Pumps shall be installed in accordance with the manufacturers' instructions.

308.4.2.2 Masonry chimneys. The *clearance* reduction methods specified in Table 308.4.2 shall not be utilized to reduce the *clearances* required for masonry *chimneys* as specified in Chapter 8 and the *International Building Code*.

308.4.2.3 Chimney connector pass-throughs. The *clearance* reduction methods specified in Table 308.4.2 shall not be utilized to reduce the clearances required for *chimney* connector pass-throughs as specified in Section 803.10.4.

308.4.2.4 Masonry fireplaces. The *clearance* reduction methods specified in Table 308.4.2 shall not be utilized to reduce the clearances required for masonry fireplaces as specified in Chapter 8 and the *International Building Code*.

308.4.2.5 Kitchen exhaust ducts. The *clearance* reduction methods specified in Table 308.4.2 shall not be utilized to reduce the minimum *clearances* required by Section 506.3.11.1 for kitchen exhaust ducts enclosed in a shaft.

SECTION 309
TEMPERATURE CONTROL

[S][BG] 309.1 Space-heating systems. Interior spaces intended for human occupancy shall be provided with active or passive space-heating systems capable of maintaining an average indoor temperature of not less than 68°F (20°C) at a point 3 feet (914 mm) above floor ((~~on the design heating day~~)) when the outside temperature is 24°F. The installation of portable space heaters shall not be used to achieve compliance with this section.

Exceptions:

1. Interior spaces where the primary purpose is not associated with human comfort.
2. Group F, H, S and U occupancies.

SECTION 310
EXPLOSION CONTROL

[F] 310.1 Required. Structures occupied for purposes involving explosion hazards shall be provided with explosion control where required by the *International Fire Code*. Explosion control systems shall be designed and installed in accordance with Section 911 of the *International Fire Code*.

SECTION 311
SMOKE AND HEAT VENTS

[F] 311.1 Required. *Approved* smoke and heat vents shall be installed in the roofs of one-story buildings where required by the *International Fire Code.* Smoke and heat vents shall be designed and installed in accordance with the *International Fire Code.*

SECTION 312
HEATING AND COOLING LOAD CALCULATIONS

[S] 312.1 Load calculations. Heating and cooling system design loads for the purpose of sizing systems, appliances and *equipment* shall be determined in accordance with the procedures described in the ((~~ASHRAE/ACCA Standard 183~~)) *International Energy Conservation Code*. ((~~Alternatively, design loads shall be determined by an *approved* equivalent computation procedure, using the design parameters specified in Chapter 3 [CE] of the *International Energy Conservation Code*.~~))

CHAPTER 4

VENTILATION

User note:

About this chapter: *Chapter 4 intends to provide an indoor atmosphere that protects the health and well-being of building occupants. Both mechanical and natural ventilation are addressed. Mechanical ventilation provides what is considered to be acceptable indoor air quality. Mechanical ventilation minimizes adverse health effects and provides an atmosphere that generally is not objectionable to occupants.*

SECTION 401
GENERAL

401.1 Scope. This chapter shall govern the ventilation of spaces within a building intended to be occupied. Mechanical exhaust systems, including exhaust systems serving clothes dryers and cooking appliances; hazardous exhaust systems; dust, stock and refuse conveyor systems; subslab soil exhaust systems; smoke control systems; energy recovery ventilation systems and other systems specified in Section 502 shall comply with Chapter 5.

[W][S] 401.2 Ventilation required. Every occupied space other than enclosed parking garages, loading docks and motor vehicle repair garages shall be ventilated in accordance with Section 401.2.1, 401.2.2, or 401.2.3. Enclosed parking garages, loading docks and motor vehicle repair garages shall be ventilated by mechanical means in accordance with sections 403 and 404.

401.2.1 Group R occupancies. Ventilation in Group R occupancies shall be provided in accordance with Section 403.4.

401.2.2 Ambulatory care facilities and Group I-2 occupancies. Ambulatory care facilities and Group I-2 occupancies shall be ventilated by mechanical means in accordance with Section 407.

401.2.3 All other occupancies. Ventilation in all other occupancies shall be provided by natural means in accordance with Section 402 or by mechanical means in accordance with Section 403. ((~~Where the air infiltration rate in a dwelling unit is less than 5 air changes per hour when tested with a blower door at a pressure of 0.2 inch water column (50 Pa) in accordance with Section R402.4.1.2 of the *International Energy Conservation Code*, the dwelling unit shall be ventilated by mechanical means in accordance with Section 403. Ambulatory care facilities and Group I-2 occupancies shall be ventilated by mechanical means in accordance with Section 407.~~))

[W] 401.3 When required. Group R *occupancies* shall be vented continuously or intermittently in accordance with Section 403.4. Ventilation in all other *occupancies* shall be provided during the periods that the room or space is occupied.

[W][S] 401.4 Intake opening location. Air intake openings shall comply with all of the following:

1. Intake openings shall be located not less than 10 feet (3048 mm) from lot lines or buildings on the same lot. Where openings front on a street or public way, the distance shall be measured from the opposite side of the street or public way.
2. Mechanical and gravity outdoor air intake openings shall be located not less than 10 feet (3048 mm) horizontally from any hazardous or noxious contaminant source, such as vents, streets, alleys, parking lots and loading docks, except as specified in Item 3 or Section 501.3.1. Outdoor air intake openings shall be permitted to be located less than 10 feet (3048 mm) horizontally from streets, alleys, parking lots and loading docks provided that the openings are located not less than 25 feet (7620 mm) vertically above such locations. Where openings front on a street or public way, the distance shall be measured from the closest edge of the street or public way.

   Exception: Enclosed parking garage and repair garage intakes are permitted to be located less than 10 feet horizontally of the street, alley, parking lots and loading docks.
3. Intake openings shall be located not less than 3 feet (914 mm) below contaminant sources where such sources are located within 10 feet (3048 mm) of the opening.

   Exception: Separation is not required between intake air openings and living space relief air exhaust air openings of an individual dwelling unit or sleeping unit, not to include common areas outside of the dwelling or sleeping unit, where a factory-built intake/exhaust combination termination fitting, listed and installed in accordance with the manufacturer's instructions, is used to separate the air streams. A minimum of 5 feet (914 mm) horizontal separation between other environmental air exhaust outlets and other dwelling or sleeping unit factory-built intake/exhaust combination termination fittings shall be maintained.
4. Intake openings on structures in flood hazard areas shall be at or above the elevation required by Section 1612 of the *International Building Code* for utilities and attendant equipment.
5. Intake openings shall not be located:

   5.1. In a crawl space;

5.2. Less than one foot (305 mm) above a roof, adjacent grade, or other surface directly below the intake; or

5.3. Under a deck having a surface height less than three feet above grade or other surface directly below the intake.

Interpretation: For purposes of this section, lot line includes any property line separating one lot from another lot, but does not include any property line separating a lot from a public street or alley right-of-way.

401.5 Intake opening protection. Air intake openings that terminate outdoors shall be protected with corrosion-resistant screens, louvers or grilles. Openings in louvers, grilles and screens shall be sized in accordance with Table 401.5, and shall be protected against local weather conditions. Louvers that protect air intake openings in structures located in hurricane-prone regions, as defined in the *International Building Code*, shall comply with AMCA 550. Outdoor air intake openings located in exterior walls shall meet the provisions for exterior wall opening protectives in accordance with the *International Building Code.*

TABLE 401.5
OPENING SIZES IN LOUVERS, GRILLES AND SCREENS PROTECTING AIR INTAKE OPENINGS

OUTDOOR OPENING TYPE	MINIMUM AND MAXIMUM OPENING SIZES IN LOUVERS, GRILLES AND SCREENS[a]
Intake openings in residential occupancies	Not < 1/4 inch and not > 1/2 inch
Intake openings in other than residential occupancies	> 1/4 inch and not > 1 inch

For SI: 1 inch = 25.4 mm.

a. For rectangular openings, the table requirements apply to the shortest side. For round openings, the table requirements apply to the diameter. For square openings, the table requirements apply to any side.

401.6 Contaminant sources. Stationary local sources producing airborne particulates, heat, odors, fumes, spray, vapors, smoke or gases in such quantities as to be irritating or injurious to health shall be provided with an exhaust system in accordance with Chapter 5 or a means of collection and removal of the contaminants. Such exhaust shall discharge directly to an *approved* location at the exterior of the building.

[W][S] 401.7 Compliance and commissioning. Compliance with Sections 402 through 403.4 shall be demonstrated through engineering calculations. Documentation of calculations shall be submitted with the permit plan sets. Testing and commissioning shall be performed and documented in accordance with the International Energy Conservation Code.

SECTION 402
NATURAL VENTILATION

[S][BG] 402.1 Natural ventilation. *Natural ventilation* of an occupied space shall be through windows, doors, louvers or other openings to the outdoors. The operating mechanism for such openings shall be provided with ready access so that the openings are readily controllable by the building occupants.

Exception: Automatically controlled *natural ventilation* systems do not require ready access and control by building occupants.

[BG] 402.2 Ventilation area required. The minimum openable area to the outdoors shall be 4 percent of the floor area being ventilated.

[BG] 402.3 Adjoining spaces. Where rooms and spaces without openings to the outdoors are ventilated through an adjoining room, the opening to the adjoining rooms shall be unobstructed and shall have an area not less than 8 percent of the floor area of the interior room or space, but not less than 25 square feet (2.3 m^2). The minimum openable area to the outdoors shall be based on the total floor area being ventilated.

Exception: Exterior openings required for ventilation shall be permitted to open into a thermally isolated sunroom addition or patio cover, provided that the openable area between the sunroom addition or patio cover and the interior room has an area of not less than 8 percent of the floor area of the interior room or space, but not less than 20 square feet (1.86 m^2). The minimum openable area to the outdoors shall be based on the total floor area being ventilated.

[BG] 402.4 Openings below grade. Where openings below grade provide required *natural ventilation*, the outdoor horizontal clear space measured perpendicular to the opening shall be one and one-half times the depth of the opening. The depth of the opening shall be measured from the average adjoining ground level to the bottom of the opening.

SECTION 403
MECHANICAL VENTILATION

[W] 403.1 Ventilation system. Mechanical ventilation shall be provided by a method of supply air and return or *exhaust air*. ((~~except that mechanical ventilation air requirements for Group R-2, R-3 and R-4 occupancies three stories and less in height above grade plane shall be provided by an exhaust system, supply system or combination thereof.~~)) The amount of supply air

shall be approximately equal to the amount of return and *exhaust air*. The system shall not be prohibited from producing negative or positive pressure. The system to convey *ventilation air* shall be designed and installed in accordance with Chapter 6.

[W][S] 403.2 Outdoor air required. The minimum outdoor ((~~airflow~~)) flow rate shall be determined in accordance with Section 403.3.

Exceptions:

1. Where the *registered design professional* demonstrates that an engineered ventilation system design will prevent the maximum concentration of contaminants from exceeding that obtainable by the rate of outdoor air ventilation determined in accordance with Section 403.3, the minimum required rate of outdoor air shall be reduced in accordance with such engineered system design.
2. Alternate systems designed in accordance with ASHRAE Standard 62.1 Section 6.2, Ventilation Rate Procedure, shall be permitted.

[W] 403.2.1 Recirculation of air. The ((~~outdoor~~)) air required by Section 403.3 shall not be recirculated. Air in excess of that required by Section 403.3 shall not be prohibited from being recirculated as a component of supply air to building spaces, except that:

1. Ventilation air shall not be recirculated from one *dwelling* to another or to dissimilar occupancies.
2. Supply air to a swimming pool and associated deck areas shall not be recirculated unless such air is dehumidified to maintain the relative humidity of the area at 60 percent or less. Air from this area shall not be recirculated to other spaces where ((~~more than~~)) 10 percent or more of the resulting supply airstream consists of air recirculated from these spaces.
3. Where mechanical exhaust is required by Note b in Table 403.3.1.1, recirculation of air from such spaces shall be prohibited. ((~~Recirculation of air that is contained completely within such spaces shall not be prohibited. Where recirculation of air is prohibited, all~~)) All air supplied to such spaces shall be exhausted, including any air in excess of that required by Table 403.3.1.1.

[W][S] 4. ((~~Where mechanical exhaust is required by Note g in Table 403.3.1.1, mechanical exhaust is required and recirculation from such spaces is prohibited where more than 10 percent of the resulting supply airstream consists of air recirculated from these spaces.~~)) Air used as transfer for heat removal may be circulated. Return air from such spaces shall only be permitted to be recirculated when returned to an energy recovery ventilation system complying with Section 514. Recirculation of air that is contained completely within such spaces shall not be prohibited.

403.2.2 Transfer air. Except where recirculation from such spaces is prohibited by Table 403.3.1.1, air transferred from occupiable spaces is not prohibited from serving as *makeup air* for required exhaust systems in such spaces as kitchens, baths, toilet rooms, elevators and smoking lounges. The amount of transfer air and *exhaust air* shall be sufficient to provide the flow rates as specified in Section 403.3.1.1. The required outdoor airflow rates specified in Table 403.3.1.1 shall be introduced directly into such spaces or into the occupied spaces from which air is transferred or a combination of both.

[W] 403.3 Outdoor air and local exhaust airflow rates. Group ((~~R-2, R-3 and R-4~~)) R occupancies ((~~three stories and less in height above grade plane~~)) shall be provided with outdoor air and local exhaust in accordance with Section ((~~403.3.2~~)) 403.4. ((~~Other~~)) All other buildings intended to be occupied shall be provided with outdoor air and local exhaust in accordance with Section 403.3.1.

403.3.1 Other buildings intended to be occupied. The design of local exhaust systems and ventilation systems for outdoor air for occupancies other than Group R-2, R-3 and R-4 three stories and less above grade plane shall comply with Sections 403.3.1.1 through 403.3.1.5.

[W] 403.3.1.1 Outdoor airflow rate. Ventilation systems shall be designed to have the capacity to supply the minimum outdoor airflow rate, determined in accordance with this section. In each occupiable space, the ventilation system shall be designed to deliver the required rate of outdoor airflow to the *breathing zone*. Outdoor air shall be supplied directly to each occupiable space from an air handling unit through a fully ducted path or ducted to within 12 inches of the return air opening of a fan-powered terminal unit used to transfer the outdoor air to the occupiable space.

The occupant load utilized for design of the ventilation system shall be not less than the number determined from the estimated maximum occupant load rate indicated in Table 403.3.1.1. Ventilation rates for occupancies not represented in Table 403.3.1.1 shall be those for a listed *occupancy* classification that is most similar in terms of occupant density, activities and building construction; or shall be determined by an *approved* engineering analysis. The ventilation system, including transfer fan-powered terminal units, shall be designed to supply the required rate of *ventilation air* continuously during the period the building is occupied, except as otherwise stated in other provisions of the code.

With the exception of smoking lounges, the ventilation rates in Table 403.3.1.1 are based on the absence of smoking in occupiable spaces. Where smoking is anticipated in a space other than a smoking lounge, the ventilation system serving the space shall be designed to provide ventilation over and above that required by Table 403.3.1.1 in accordance with accepted engineering practice.

Exception: ((~~The occupant load is not required to be determined based on the estimated maximum occupant load rate indicated in Table 403.3.1.1 where *approved* statistical data document the accuracy of an alternate anticipated occupant density.~~)) Where *occupancy* density is known and documented in the plans, the outside air rate may be based on the design occupant density. Under no circumstance shall the *occupancies* used result in outside air less than one-half that resulting from application of TABLE 403.3.1.1 estimated maximum *occupancy* rates.

[W][S] TABLE 403.3.1.1
((~~MINIMUM VENTILATION RATES~~)) REQUIRED OUTDOOR VENTILATION AIR

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY #/1000 FT^2 [a]	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT^2 [a]	EXHAUST AIRFLOW RATE CFM/FT^2 [a]
Correctional facilities				
Booking/waiting	50	7.5	0.06	—
Cells				
without plumbing fixtures	25	5	0.12	—
[S] with plumbing fixtures[g, o]	25	5	0.12	1.0
Day room	30	5	0.06	—
Dining halls (see "Food and beverage service")	—	—	—	—
Guard stations	15	5	0.06	—
Dry cleaners, laundries				
Coin-operated dry cleaner	20	15	—	—
Coin-operated laundries	20	7.5	0.12	—
Commercial dry cleaner	30	30	—	—
Commercial laundry	10	25	—	—
Storage, pick up	30	7.5	0.12	—
Education				
Art classroom[g]	20	10	0.18	0.7
Auditoriums	150	5	0.06	—
Classrooms (ages 5-8)	25	10	0.12	—
Classrooms (age 9 plus)	35	10	0.12	—
Computer lab	25	10	0.12	—
Corridors (see "Public spaces")	—	—	—	—
Day care (through age 4)	25	10	0.18	—
Lecture classroom	65	7.5	0.06	—
Lecture hall (fixed seats)	150	7.5	0.06	—
[S] Locker/dressing rooms[g, o]	—	—	—	0.25
Media center	25	10	0.12	—
Multiuse assembly	100	7.5	0.06	—
Music/theater/dance	35	10	0.06	—
[S] Science laboratories[g, o]	25	10	0.18	1.0
[S] ((~~Smoking lounges[b]~~	~~70~~	~~60~~	~~—~~	~~—~~))
Sports locker rooms[g, o]	—	—	—	0.5
Wood/metal shops[g, o]	20	10	0.18	0.5
Food and beverage service				
Bars, cocktail lounges	100	7.5	0.18	—
Cafeteria, fast food	100	7.5	0.18	—
Dining rooms	70	7.5	0.18	—
Kitchens (cooking)[b]	20	7.5	0.12	0.7

[W][S] TABLE 403.3.1.1—continued
((~~MINIMUM VENTILATION RATES~~)) REQUIRED OUTDOOR VENTILATION AIR

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY #/1000 FT^2 [a]	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT^2 [a]	EXHAUST AIRFLOW RATE CFM/FT^2 [a]
Hotels, motels, resorts and dormitories				
[S] Bathrooms/toilet—private[g, o]	—	—	—	25/50[f]
Bedroom/living room	10	5	0.06	—
Conference/meeting	50	5	0.06	—
Dormitory sleeping areas	20	5	0.06	—
Gambling casinos	120	7.5	0.18	—
Lobbies/prefunction	30	7.5	0.06	—
Multipurpose assembly	120	5	0.06	—
Offices				
Conference rooms	50	5	0.06	—
[W] Kitchenettes[k]	25	5	0.06	0.30
Main entry lobbies	10	5	0.06	—
Office spaces	5	5	0.06	—
Reception areas	30	5	0.06	—
Telephone/data entry	60	5	0.06	—
Private dwellings, single and multiple				
Garages, common for multiple units[b]	—	—	—	0.75
[W] Kitchens[b]	—	—	—	((~~25/100[f]~~)) See Table 403.4.7
[W] Living areas[c]	Based on number of bedrooms. First bedroom, 2; each additional bedroom, 1	((~~0.35 ACH but not less than 15 cfm/person~~)) See Table 403.4.2	—	—
[W] Toilet rooms, ((~~and~~)) bathrooms[o] and laundry areas[g, i]	—	—	—	((~~20/50[f]~~)) See Table 403.4.7
Public spaces				
[W] Corridors serving other than Group R occupancies	—	—	0.06	—
[W] Corridors serving Group R dwelling or sleeping units with whole house exhaust system	—	—	0.12	—
[W] Corridors serving Group R dwelling or sleeping units with other than whole house exhaust system	—	—	0.06	—
Courtrooms	70	5	0.06	—
Elevator car	—	—	—	1.0
[W][S] Elevator lobbies in parking garages[n]	—	—	1.0[o]	—
Legislative chambers	50	5	0.06	—
Libraries	10	5	0.12	—
Museums (children's)	40	7.5	0.12	—
Museums/galleries	40	7.5	0.06	—
Places of religious worship	120	5	0.06	—
Shower room (per shower head)[g]	—	—	—	50/20[f]
[S] ((~~Smoking lounges[b]~~	~~70~~	~~60~~	~~—~~	~~—~~))
Toilet rooms — public[g]	—	—	—	50/70[e]

[W][S] TABLE 403.3.1.1—continued
((~~MINIMUM VENTILATION RATES~~)) REQUIRED OUTDOOR VENTILATION AIR

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY #/1000 FT^2 [a]	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT^2 [a]	EXHAUST AIRFLOW RATE CFM/FT^2 [a]
Retail stores, sales floors and showroom floors				
Dressing rooms	—	—	—	0.25
Mall common areas	40	7.5	0.06	—
Sales	15	7.5	0.12	—
Shipping and receiving	2	10	0.12	—
[S] ((~~Smoking lounges~~[b]	~~70~~	~~60~~	~~—~~	~~—~~))
Storage rooms	—	—	0.12	—
Warehouses (see "Storage")	—	10	0.06	—
Specialty shops				
Automotive motor-fuel dispensing stations[b]	—	—	—	1.5
[S] Barber	25	((~~7.5~~)) 20	0.06	0.5
Beauty salons[b]	25	20	0.12	0.6
Nail salons [b, h]	25	20	0.12	0.6
Embalming room[b]	—	—	—	2.0
Pet shops (animal areas)[b]	10	7.5	0.18	0.9
Supermarkets	8	7.5	0.06	—
Sports and amusement				
Bowling alleys (seating areas)	40	10	0.12	—
Disco/dance floors	100	20	0.06	—
Game arcades	20	7.5	0.18	—
[W] Gym, stadium, arena (play area)[i]	((~~7~~)) —	((~~20~~)) —	((~~0.18~~)) 0.30	—
Health club/aerobics room	40	20	0.06	—
Health club/weight room	10	20	0.06	—
Ice arenas without combustion engines[j]	—	—	0.30	0.5
Spectator areas	150	7.5	0.06	—
Swimming pools (pool and deck area)	—	—	0.48	—
Storage				
[W] Janitor closets, trash rooms, recycling rooms	—	—	—	1.0
[W] Repair garages[d] ((~~, enclosed parking garages~~[b,d]))	—	—	—	0.75
[S] Enclosed loading docks[d]	—	—	—	1.5
[S] Enclosed parking garages[d]	—	—	—	0.75
[S] Ticket booths (within enclosed parking garages)[l]	60	—	—	—
[W] Storage rooms, chemical	—	—	—	1.5
[S] Refrigerated warehouses/freezers[m]	—	10	—	—
Warehouses	—	10	0.06	—
[S] Non-retail storage spaces >100 sf [o]	—	—	0.06	—
Theaters				
Auditoriums (see "Education")	—	—	—	—
Lobbies	150	5	0.06	—
Stages, studios	70	10	0.06	—
Ticket booths	60	5	0.06	—
Transportation				
Platforms	100	7.5	0.06	—
Transportation waiting	100	7.5	0.06	—

[W][S] TABLE 403.3.1.1—continued
((~~MINIMUM VENTILATION RATES~~)) REQUIRED OUTDOOR VENTILATION AIR

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY #/1000 FT^2 [a]	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT^2 [a]	EXHAUST AIRFLOW RATE CFM/FT^2 [a]
Workrooms				
Bank vaults/safe deposit	5	5	0.06	—
Computer (without printing)	4	5	0.06	—
Copy, printing rooms	4	5	0.06	0.5
Darkrooms	—	—	—	1.0
[W] Freezer and refrigerated spaces (<50°F)[m]	0	10	0	0
Meat processing[c]	10	15	—	—
Pharmacy (prep. area)	10	5	0.18	—
Photo studios	10	5	0.12	—

For SI: 1 cubic foot per minute = 0.0004719 m^3/s, 1 ton = 908 kg, 1 cubic foot per minute per square foot = 0.00508 m^3/(s • m^2), °C = [(°F) - 32]/1.8, 1 square foot = 0.0929 m^2.

a. Based upon net occupiable floor area.

b. Mechanical exhaust required and the recirculation of air from such spaces is prohibited. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1, Item 3).

c. Spaces unheated or maintained below 50°F are not covered by these requirements unless the occupancy is continuous.

d. Ventilation systems ((~~in enclosed parking garages~~)) shall comply with Section 404.

e. Rates are per water closet or urinal. The higher rate shall be provided where the exhaust system is designed to operate intermittently. The lower rate shall be permitted only where the exhaust system is designed to operate continuously while occupied.

f. Rates are per room unless otherwise indicated. The higher rate shall be provided where the exhaust system is designed to operate intermittently. The lower rate shall be permitted only where the exhaust system is designed to operate continuously while occupied.

[W][S] g. Mechanical exhaust is required and recirculation from such spaces is prohibited. ((~~except that recirculation shall be permitted where the resulting supply airstream consists of not more than 10 percent air recirculated from these spaces. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1, Items 2 and 4).~~))

h. For nail salons, each manicure and pedicure station shall be provided with a source capture system capable of exhausting not less than 50 cfm per station. Exhaust inlets shall be located in accordance with Section 502.20. Where one or more required source capture systems operate continuously during occupancy, the exhaust rate from such systems shall be permitted to be applied to the exhaust flow rate required by Table 403.3.1.1 for the nail salon.

[W] i. A laundry area within a kitchen or bathroom is not required to have local exhaust. For the laundry area to qualify as being within the kitchen, the laundry room door must be open directly into the kitchen and not into an adjacent corridor. Where there are doors that separate the laundry area from the kitchen or bathroom the door shall be louvered.

[W] j. When combustion equipment is intended to be used on the playing surface, additional dilution ventilation and/or source control shall be provided.

[W] k. Kitchenettes require exhaust when they contain a domestic cooking appliance range or oven that is installed in accordance with Table 507.2.1. Kitchenettes that only contain a microwave cooking appliance are not required to have exhaust. A kitchenette may not contain commercial cooking appliances that require Type I or Type II exhaust as these occupancies are required to be exhausted to the kitchen category in Table 403.3.1.1.

[S] l. This space shall be maintained at a positive pressure.

[S] m. For occupied freezer and refrigerated spaces utilize proposed occupant density for outdoor airflow rates.

[S] n. The required outdoor airflow rate shall be introduced directly into such spaces or into the occupied space from which the air is transferred or a combination of both.

[S] o. Transfer air permitted in accordance with Section 403.2.2. For non-retail storage areas, transfer air is also permitted from an adjacent open parking garage, or an enclosed parking garage or loading dock that is mechanically ventilated in accordance with Section 404

403.3.1.1.1 Zone outdoor airflow. The minimum outdoor airflow required to be supplied to each zone shall be determined as a function of *occupancy* classification and space air distribution effectiveness in accordance with Sections 403.3.1.1.1.1 through 403.3.1.1.1.3.

403.3.1.1.1.1 Breathing zone outdoor airflow. The outdoor airflow rate required in the *breathing zone* (V_{bz}) of the *occupiable space* or spaces in a zone shall be determined in accordance with Equation 4-1.

$$V_{bz} = R_p P_z + R_a A_z \qquad \textbf{(Equation 4-1)}$$

where:

A_z = Zone floor area: the *net occupiable floor area* of the space or spaces in the zone.

P_z = Zone population: the number of people in the space or spaces in the zone.

R_p = People outdoor air rate: the outdoor airflow rate required per person from Table 403.3.1.1.

R_a = Area outdoor air rate: the outdoor airflow rate required per unit area from Table 403.3.1.1.

403.3.1.1.1.2 Zone air distribution effectiveness. The zone air distribution effectiveness (E_z) shall be determined using Table 403.3.1.1.1.2.

TABLE 403.3.1.1.1.2
ZONE AIR DISTRIBUTION EFFECTIVENESS[a,b,c,d]

AIR DISTRIBUTION CONFIGURATION	E_z
Ceiling or floor supply of cool air	1.0[e]
Ceiling or floor supply of warm air and floor return	1.0
Ceiling supply of warm air and ceiling return	0.8[f]
Floor supply of warm air and ceiling return	0.7
Makeup air drawn in on the opposite side of the room from the exhaust or return	0.8
Makeup air drawn in near to the exhaust or return location	0.5

For SI: 1 foot = 304.8 mm, 1 foot per minute = 0.00506 m/s,
°C = [(°F) – 32]/1.8.

a. "Cool air" is air cooler than space temperature.
b. "Warm air" is air warmer than space temperature.
c. "Ceiling" includes any point above the breathing zone.
d. "Floor" includes any point below the breathing zone.
e. Zone air distribution effectiveness of 1.2 shall be permitted for systems with a floor supply of cool air and ceiling return, provided that low-velocity displacement ventilation achieves unidirectional flow and thermal stratification.
f. Zone air distribution effectiveness of 1.0 shall be permitted for systems with a ceiling supply of warm air, provided that supply air temperature is less than 15°F above space temperature and provided that the 150-foot-per-minute supply air jet reaches to within 4-1/2 feet of floor level.

403.3.1.1.1.3 Zone outdoor airflow. The zone outdoor airflow rate (V_{oz}), shall be determined in accordance with Equation 4-2.

$$V_{oz} = \frac{V_{bz}}{E_z} \qquad \textbf{(Equation 4-2)}$$

403.3.1.1.2 System outdoor airflow. The outdoor air required to be supplied by each ventilation system shall be determined in accordance with Sections 403.3.1.1.2.1 through 403.3.1.1.2.3.4 as a function of system type and zone outdoor airflow rates.

403.3.1.1.2.1 Single zone systems. Where one air handler supplies a mixture of outdoor air and recirculated return air to only one zone, the system outdoor air intake flow rate (V_{ot}) shall be determined in accordance with Equation 4-3.

$$V_{ot} = V_{oz} \qquad \textbf{(Equation 4-3)}$$

403.3.1.1.2.2 100-percent outdoor air systems. Where one air handler supplies only outdoor air to one or more zones, the system outdoor air intake flow rate (V_{ot}) shall be determined using Equation 4-4.

$$V_{ot} = \Sigma_{all\ zones} V_{oz} \qquad \textbf{(Equation 4-4)}$$

[W] 403.3.1.1.2.3 Multiple zone recirculating systems. ((~~Where~~)) For ventilation systems wherein one or more air handlers ((~~supplies~~)) supply a mixture of outdoor air and recirculated ((~~return~~)) air to more than one ventilation zone, the system outdoor air intake flow rate (V_{ot}) shall be determined in accordance with Sections 403.3.1.1.2.3.1 through 403.3.1.1.2.3.4.

403.3.1.1.2.3.1 ((~~Primary outdoor air fraction~~)) Uncorrected outdoor air intake. ((~~The primary outdoor air fraction (Z_p) shall be determined for each zone in accordance with Equation 4-5.~~

$$\cancel{Z_p = \frac{V_{oz}}{V_{pz}}} \qquad \cancel{\textbf{(Equation 4-5)}}$$

~~where:~~

~~V_{pz} = Primary airflow: The airflow rate supplied to the zone from the air-handling unit at which the outdoor air intake is located. It includes outdoor intake air and recirculated air from that air-handling unit but does not include air transferred or air recirculated to the zone by other means. For design purposes, V_{pz} shall be the zone design primary airflow rate, except for zones with variable air volume supply and V_{pz} shall be the lowest expected primary airflow rate to the zone when it is fully occupied.~~)) The uncorrected outdoor air intake flow (V_{ot}) shall be determined in accordance with Equation 4-5.

$$V_{ou} = D\Sigma_{all\ zones}(R_p \times P_z) + \Sigma_{all\ zones}(R_a \times A_z)$$ **(Equation 4-5)**

403.3.1.1.2.3.1.1 Occupant diversity. The occupant diversity ratio (D) shall be determined in accordance with Equation 4-6 to account for variations in population within the ventilation zones served by the system.

$$D = P_s/\Sigma_{all\ zones}P_z$$ **(Equation 4-6)**

where: P_s = System population: The total population in the area served by the system.

Exception: Alternative methods to account for occupant diversity shall be permitted, provided the resulting V_{ou} value is no less than that determined using Equation 4-5.

403.3.1.1.2.3.1.2 Design system population. Design system population (P_s) shall equal the largest (peak) number of people expected to occupy all ventilation zones served by the ventilation system during use.

Note: Design system population is always equal to or less than the sum of design zone population for all zones in the area served by the system because all zones may or may not be simultaneously occupied at design population.

[W] 403.3.1.1.2.3.2 System ventilation efficiency. The system ventilation efficiency (E_v) shall be determined ((~~using Table 403.3.1.1.2.3.2~~)) in accordance with Section 403.3.1.1.2.3.3 or Appendix A of ASHRAE 62.1 for the Alternative Procedure.

Note: These procedures also establish zone minimum primary air-flow rates for VAV systems.

TABLE 403.3.1.1.2.3.2
SYSTEM VENTILATION EFFICIENCY[a,b]

Max (Z_p)	E_v
≤ 0.15	1
≤ 0.25	0.9
≤ 0.35	0.8
≤ 0.45	0.7
≤ 0.55	0.6
≤ 0.65	0.5
≤ 0.75	0.4
> 0.75	0.3

a. *Max* (Z_p) is the largest value of Z_p calculated using Equation 4-5 among all the zones served by the system.
b. Interpolating between table values shall be permitted.

[W] 403.3.1.1.2.3.3 ((~~Uncorrected outdoor air intake~~)) Simplified procedure. ((~~The uncorrected outdoor air intake flow rate (V_{ou}) shall be determined in accordance with Equation 4-6.~~

~~$V_{ou} = D\Sigma_{all\ zones}R_pP_z + \Sigma_{all\ zones}R_aA_z$~~ ~~**(Equation 4-6)**~~

~~where:~~

~~D = Occupant diversity: the ratio of the system population to the sum of the zone populations, determined in accordance with Equation 4-7.~~

~~$D = \frac{P_s}{\Sigma_{all\ zones}P_z}$~~ ~~**(Equation 4-7)**~~

~~where:~~

~~P_s = System population: The total number of occupants in the area served by the system. For design purposes, P_s shall be the maximum number of occupants expected to be concurrently in all zones served by the system.~~))

403.3.1.1.2.3.3.1 System ventilation efficiency. System ventilation efficiency (Ev) shall be determined in accordance with Equation 4-6a or 4-6b.

$E_v = 0.88 \times D + 0.22$ for $D < 0.60$ **(Equation 4-6a)**

$E_v = 0.75$ for $D \geq 0.60$ **(Equation 4-6b)**

403.3.1.1.2.3.3.2 Zone minimum primary airflow. For each zone, the minimum primary airflow (V_{pz}-*min*) shall be determined in accordance with Equation 4-7.

$V_{pz}\text{-}min = V_{oz} \times 1.5$ **(Equation 4-7)**

[W] 403.3.1.1.2.3.4 Outdoor air intake flow rate. The design outdoor air intake flow rate (V_{ot}) shall be determined in accordance with Equation 4-8.

$$V_{ot} = \frac{V_{ou}}{E_v}$$ **(Equation 4-8)**

403.3.1.2 Exhaust ventilation. Exhaust airflow rate shall be provided in accordance with the requirements of Table 403.3.1.1. Outdoor air introduced into a space by an exhaust system shall be considered as contributing to the outdoor airflow required by Table 403.3.1.1.

403.3.1.3 System operation. The minimum flow rate of outdoor air that the ventilation system must be capable of supplying during its operation shall be permitted to be based on the rate per person indicated in Table 403.3.1.1 and the actual number of occupants present.

[S] 403.3.1.4 Variable air volume system control. Variable air volume air distribution systems, other than those designed to supply only 100-percent outdoor air, shall be provided with controls to regulate the flow of outdoor air. Such control system shall be designed to maintain the flow rate of outdoor air at a rate of not less than that required by Section 403.3 over the entire range of supply air operating rates. Calculations and a description of controls operation shall be submitted with the permit drawings.

403.3.1.5 Balancing. The *ventilation* air distribution system shall be provided with means to adjust the system to achieve not less than the minimum ventilation airflow rate as required by Sections 403.3 and 403.3.1.2. Ventilation systems shall be balanced by an *approved* method. Such balancing shall verify that the ventilation system is capable of supplying and exhausting the airflow rates required by Sections 403.3 and 403.3.1.2.

[W] 403.3.2 Group R-2, R-3 and R-4 occupancies, three stories and less. ((~~The design of local exhaust systems and ventilation systems for outdoor air in Group R-2, R-3 and R-4 occupancies three stories and less in height above grade plane shall comply with Sections 403.3.2.1 through 403.3.2.5.~~)) Sections 403.3.2 through 403.3.2.5 are not adopted, see Section 403.4.

((~~**403.3.2.1 Outdoor air for dwelling units.** An outdoor air ventilation system consisting of a mechanical exhaust system, supply system or combination thereof shall be installed for each dwelling unit. Local exhaust or supply systems, including outdoor air ducts connected to the return side of an air handler, are permitted to serve as such a system. The outdoor air ventilation system shall be designed to provide the required rate of outdoor air continuously during the period that the building is occupied. The minimum continuous outdoor airflow rate shall be determined in accordance with Equation 4-9.~~

$Q_{OA} = 0.01A_{floor} + 7.5(N_{br} + 1)$ ~~**(Equation 4-9)**~~

~~where:~~

~~Q_{OA} = outdoor airflow rate, cfm~~

~~A_{floor} = floor area, ft^2~~

~~N_{br} = number of bedrooms; not to be less than one~~

~~**Exception:** The outdoor air ventilation system is not required to operate continuously where the system has controls that enable operation for not less than 1 hour of each 4-hour period. The average outdoor airflow rate over the 4-hour period shall be not less than that prescribed by Equation 4-9.~~

~~**403.3.2.2 Outdoor air for other spaces.** Corridors and other common areas within the conditioned space shall be provided with outdoor air at a rate of not less than 0.06 cfm per square foot of floor area.~~

~~**403.3.2.3 Local exhaust.** Local exhaust systems shall be provided in kitchens, bathrooms and toilet rooms and shall have the capacity to exhaust the minimum airflow rate determined in accordance with Table 403.3.2.3.~~))

((~~**TABLE 403.3.2.3**~~
~~**MINIMUM REQUIRED LOCAL EXHAUST RATES FOR GROUP R-2, R-3, AND R-4 OCCUPANCIES**~~

~~AREA TO BE EXHAUSTED~~	~~EXHAUST RATE CAPACITY~~
~~Kitchens~~	~~100 cfm intermittent or 25 cfm continuous~~
~~Bathrooms and toilet rooms~~	~~50 cfm intermittent or 20 cfm continuous~~

~~For SI: 1 cubic foot per minute = 0.0004719 m^3/s.~~))

((~~**403.3.2.4 System controls.** Where provided within a dwelling unit, controls for outdoor air ventilation systems shall include text or a symbol indicating the system's function.~~

~~**403.3.2.5 Ventilating equipment.** Exhaust equipment serving single dwelling units shall be listed and labeled to provide the minimum required air flow in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51.~~))

[W] 403.4 Group R whole house mechanical ventilation system. Each dwelling unit or sleeping unit shall be equipped with a whole house mechanical ventilation system that complies with Sections 403.4.1 through 403.4.6.

Each dwelling unit or sleeping unit shall be equipped with local exhaust complying with Section 403.4.7. All occupied spaces, including public corridors, other than the Group R dwelling units and/or sleeping units, that support these Group R occupancies shall meet the ventilation requirement of natural ventilation requirements of Section 402 or the mechanical ventilation requirements of Sections 403.1 through 403.3.

[W] 403.4.1 System design. The whole house ventilation system shall consist of one or more supply fans, one or more exhaust fans, or an ERV/HRV with integral fans; and the associated ducts and controls. Local exhaust fans shall be permitted to serve as part of the whole house ventilation system when provided with the proper controls in accordance with Section 403.4.5. The systems shall be designed and installed to supply and exhaust the minimum outdoor airflow rates per Section 403.4.2 as corrected by the balanced and/or *distributed whole house ventilation* system coefficients in accordance with Section 403.4.3 where applicable.

[W] 403.4.2 Whole house mechanical ventilation rates. The sleeping unit whole house mechanical ventilation minimum outdoor airflow rate shall be determined in accordance with the breathing zone ventilation rates minimum outdoor airflow rate shall be determined in accordance with the breathing zone ventilation rates requirements of Section 403.3.1.1.1.2 using Equation 4-2. The dwelling unit whole house mechanical ventilation minimum outdoor airflow rate shall be determined in accordance with Equation 4-10 or Table 403.4.2.

[W] TABLE 403.4.2
WHOLE HOUSE MECHANICAL VENTILATION AIRFLOW RATE
(CONTINUOUSLY OPERATING SYSTEMS)

FLOOR AREA (ft^2)	BEDROOMS[a]				
	1	2	3	4	5
< 500	30	30	35	45	50
500 – 1000	30	35	40	50	55
1001 – 1500	30	40	45	55	60
1501 – 2000	35	45	50	60	65
2001 – 2500	40	50	55	65	70
2501 – 3000	45	55	60	70	75
3001 – 3500	50	60	65	75	80
3501 – 4000	55	65	70	80	85
4001 – 4500	60	70	75	85	90
4501 – 5000	65	75	80	90	95

a. Minimum airflow (Q_r) is set at not less than 30 cfm for each dwelling unit.

$$Q_r = 0.01 \times A_{floor} + 7.5 \times (N_{br} + 1) \qquad \textbf{(Equation 4-10)}$$

where:
Q_r = Ventilation airflow rate, cubic feet per minute (cfm) but not less than 30 cfm for each dwelling unit.
A_{floor} = Conditioned floor area, square feet (ft^2)
N_{br} = Number of bedrooms, not less than one.

[W] 403.4.3 Ventilation quality adjustment. The minimum whole house ventilation rate from Section 403.4.2 shall be adjusted by the system coefficient in Table 403.4.3 based on the system type not meeting the definition of a *balanced whole house ventilation* system and/or not meeting the definition of a *distributed whole house ventilation* system.

[W] TABLE 403.4.3
SYSTEM COEFFICIENT (C_{system})

SYSTEM TYPE	DISTRIBUTED	NOT DISTRIBUTED
Balanced	1.0	1.25
Not Balanced	1.25	1.5

$$Q_v = Q_r \times C_{system}$$ **(Equation 4-11)**

where:
Q_v = Quality-adjusted ventilation airflow rate in cubic feet per minute (cfm)
Q_r = Ventilation airflow rate, cubic feet per minute (cfm) from Equation 4-10 or Table 403.4.1
C_{system} = System coefficient from Table 403.4.2

Interpretation: Per the definition of *distributed whole house ventilation* system and per Section 403.4.4.1 and 403.4.4.2 the whole house supply fan shall provide ducted outdoor ventilation to each habitable space within the residential unit. The intent is that whole house ventilation systems are only allowed to have exhaust that is "Not Distributed." Therefore, the "Not Distributed" system coefficients in Table 403.4.3 are only applied to the residential unit whole house ventilation airflows when intermittent local exhaust that is not part of the unit whole house ventilation system is provided in one or more of the bathrooms or kitchen of the residential unit.

[W] 403.4.4 Whole house ventilation residential occupancies. Residential dwelling and sleeping unit whole house ventilation systems shall meet the requirements of Sections 403.4.4.1 or 403.4.4.2 depending on the occupancy of the residential unit.

403.4.4.1 Whole house ventilation in Group R-2 occupancies. Residential dwelling and sleeping units in Group R-2 occupancies system shall include supply and exhaust fans and be a *balanced whole house ventilation* system in accordance with Section 403.4.6.3. The system shall include a heat or energy recovery ventilator with a sensible heat recovery effectiveness as prescribed in Section C403.3.6 of the *Seattle Energy Code*. The whole house ventilation system shall operate continuously at the minimum ventilation rate determined in accordance with Section 403.4. The whole house supply fan shall provide ducted outdoor ventilation air to each habitable space within the residential unit.

403.4.4.2 Whole house ventilation for other than Group R-2 occupancies. Residential dwelling and sleeping units in other than Group R-2 occupancies, including I-1 condition 2 occupancies, shall have a whole house mechanical ventilation system with supply and exhaust fans in accordance with Section 403.4.6.1, 403.4.6.2, 403.4.6.3, or 403.4.6.4. The whole house ventilation system shall operate continuously at the minimum ventilation rate determined in accordance with Section 403.4.2 unless configured with intermittent off controls in accordance with Section 403.4.6.5. The whole house supply fan shall provide ducted outdoor ventilation air to each habitable space within the residential unit.

[W] 403.4.5 Whole house ventilation system controls.

1. The whole house ventilation system shall be controlled with manual switches, timers or other means that provide for automatic operation of the ventilation system that are readily accessible by the occupant.
2. Whole house mechanical ventilation system shall be provided with controls that enable manual override off of the system by the occupant during periods of poor outdoor air quality. Controls hall include permanent text or a symbol indicating their function. Recommended control permanent labeling to include text similar to the following "Leave on unless outdoor air quality s very poor." Manual controls shall be provided with ready access for the occupant.

[W] 403.4.6 Whole house ventilation system component requirements. Whole house ventilation supply and exhaust fans specified in this section shall have a minimum efficacy as prescribed in the *Washington State Energy Code*. The fans shall be rated for sound at a maximum of 1.0 sone at design airflow and static pressure conditions. Design and installation of the system or equipment shall be carried out in accordance with manufacturer's installation instructions.

Exceptions:

1. Central supply or exhaust fans serving multiple residential units do not need to comply with the maximum fan sone requirements.

2. Interior joining spaces provided with a 30 cfm transfer fan or a 25-square-foot permanent opening do not require supply ventilation air directly to the space. Transfer fans shall meet the sone rating above and have whole house ventilation controls in accordance with Section 403.4.5.

403.4.6.1 Exhaust fans. Exhaust fans required shall be ducted directly to the outside in accordance with Section 501.3. Exhaust air outlets shall be designed to limit the pressure difference to the outside to limiting the outlet free area maximum velocity to 500 feet per minute and equipped with backdraft dampers or motorized dampers in accordance with *Washington State Energy Code.* Exhaust fans shall be tested and rated in accordance with HVI 915, HVI 916, and HVI 920. Exhaust fans required in this section may be used to provide local ventilation. Exhaust fans that are designed for intermittent exhaust airflow rates higher than the continuous exhaust airflow rates in Table 403.4.3 shall be provided with occupancy sensors or humidity sensors to automatically override the fan to the high speed airflow rate. The exhaust fans shall be tested and the testing results shall be submitted and posted in accordance with Section 403.4.6.7.

Exception: Central exhaust fans serving multiple residential units do not need to comply with the HVI testing requirements.

403.4.6.2 Supply fans. Supply fans used in meeting the requirements of this section shall supply outdoor air from intake openings in accordance with Sections 401.4 and 401.5. Intake air openings shall be designed to limit the pressure difference to the outside to limiting the inlet free area maximum velocity to 500 feet per minute and when designed for intermittent off operation shall be equipped with motorized dampers in accordance with the Washington State Energy Code. Supply fans shall be tested and rated in accordance with HVI 915, HVI 916, and HVI 920. Where outdoor air is provided to each habitable dwelling unit or sleeping unit by supply fan systems the outdoor air shall be filtered. The filter shall be provided with access for regular maintenance and replacement. The filter shall have a Minimum Efficiency Rating Value (MERV) of at least 8.

Exception: Central supply fans serving multiple residential units do not need to comply with the HVI testing requirements.

403.4.6.3 *Balanced whole house ventilation* system. A *balanced whole house ventilation* system shall include both supply and exhaust fans. The supply and exhaust fans shall have airflow that is within 10 percent of each other. The tested and balanced total mechanical exhaust airflow rate is within 10 percent or 5 cfm, whichever is greater, of the total mechanical supply airflow rate. The flow rate test results shall be submitted and posted in accordance with Section 403.4.6.6. The exhaust fan shall meet the requirements of Section 403.4.6.1 . The supply fan shall meet the requirements of Section 403.4.6.2. For R-2 dwelling and sleeping units, the system is required to have *balanced whole house ventilation* but is not required to have *distributed whole house ventilation* where the not distributed system coefficient from Table 403.4.2 is utilized to correct the whole house mechanical ventilation rate. The system shall be design and balanced to meet the pressure equalization requirements of Section 501.4. Intermittent dryer exhaust, intermittent range hood exhaust, and intermittent toilet room exhaust airflow rates above the residential dwelling or sleeping unit minimum ventilation rate are exempt from the balanced airflow calculation.

403.4.6.4 Furnace integrated supply. Systems using space condition heating and/or cooling air handler fans for outdoor air supply air distribution are not permitted.

Exception: Air handler fans shall be permitted that have multi-speed or variable speed supply airflow control capability with a low speed operation not greater than 25 percent of the rated supply air flow capacity during ventilation only operation. Outdoor air intake openings must meet the provisions of Sections 401.4 and 401.5 and must include a motorized damper that is activated by the whole house ventilation system controller. Intake air openings shall be designed to limit the pressure difference to the outside to limiting the inlet free area maximum velocity to 500 ft per min. The motorized damper must be controlled to maintain the outdoor airflow intake airflow within 10 percent of the whole house mechanical exhaust airflow rate. The supply air handler shall provide supply air to each habitable space in the residential unit. The whole house ventilation system shall include exhaust fans in accordance with Section 403.4.6.1 to meet the pressure equalization requirements of Section 501.4. The flow rate for the outdoor air intake must be tested and verified at the minimum ventilation fan speed and the maximum heating or cooling fan speed. The results of the test shall be submitted and posted in accordance with Section 403.4.6.6.

403.4.6.5 Intermittent off operation. Whole house mechanical ventilation systems shall be provided with advanced controls that are configured to operate the system with intermittent off operation and shall operate for a least two hours in each four-hour segment. The whole house ventilation airflow rate determined in accordance with Section 403.4.2 as corrected by Section 403.4.3 shall be multiplied by the factor determined in accordance with Table 403.4.6.5.

[W] TABLE 403.4.6.5
INTERMITTENT WHOLE HOUSE MECHANICAL VENTILATION RATE FACTORS[a, b]

RUN-TIME PERCENTAGE IN EACH 4-HOUR SEGMENT	50%	66%	75%	100%
Factor[a]	2	1.5	1.3	1.0

a. For ventilation system run-time values between those given, the factors are permitted to be determined by interpolation.
b. Extrapolation beyond the table is prohibited.

403.4.6.6 Testing. Whole house mechanical ventilation systems shall be tested, balanced and verified to provide a flow rate not less than the minimum required by Sections 403.4.2 and 403.4.3. Testing shall be performed according to the ventilation equipment manufacturer's instructions, or by using a flow hood, flow grid, or other airflow measuring device at the mechanical ventilation fan's inlet terminals, outlet terminals or grilles or in the connected ventilation ducts. Where required by the building official, testing shall be conducted by an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the building official and shall be posted in the residential unit in accordance with Section 403.4.6.7.

403.4.6.7 Certificate. A permanent certificate shall be completed by the mechanical contractor, test and balance contractor or other approved party and posted on a wall in the space where the furnace is located, a utility room, or an *approved* location inside the building. When located on an electrical panel, the certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label, or other required labels. The certificate shall list the flow rate determined from the delivered airflow of the whole house mechanical ventilation system as installed and the type of mechanical whole house ventilation system used to comply with Section 403.4.3.

[W] 403.4.7 Local exhaust. Bathrooms, toilet rooms and kitchens shall include a local exhaust system. Such local exhaust systems shall have the capacity to exhaust the minimum airflow rate in accordance with Table 403.4.7 and Table 403.3.1.1, including notes. Fans required by this section shall be provided with controls that enable manual override or automatic occupancy sensor, humidity sensor or pollutant sensor controls. An "on/off" switch shall meet this requirement for manual controls. Manual fan controls shall be provided with ready access in the room served by the fan.

[W] TABLE 403.4.7
MINIMUM EXHAUST RATES

AREA TO BE EXHAUSTED	EXHAUST RATE	
	INTERMITTENT	CONTINUOUS
Kitchens	100 cfm	30 cfm
Bathrooms-Toilet rooms	50 cfm	20 cfm

[W][S] 403.4.7.1 Combined local exhaust and whole house ventilation controls. If the local exhaust fan is included in a whole house ventilation system in accordance with Section 403.4.6, the exhaust fan shall be controlled to operate as specified in Section 403.4.5.

403.4.7.2 Local exhaust fans. Exhaust fans shall meet the following criteria:

1. Exhaust fans shall be tested and rated in accordance with HVI 915, HVI 916, and HVI 920.

   Exception: Where a range hood or down draft exhaust fan is used for local exhaust for a kitchen, the device is not required to be rated per these standards.

2. Fan airflow rating and duct system shall be designed and installed to deliver at least the exhaust airflow required by Table 403.4.7. The airflows required refer to the delivered airflow of the system as installed and tested using a flow hood, flow grid, or other airflow measurement device. Local exhaust systems shall be tested, balanced and verified to provide a flow rate not less than the minimum required by this section.

   Exceptions:

   1. An exhaust airflow rating at a pressure of 0.25 in. w.g. may be used, provided the duct sizing meets the prescriptive requirements of Table 403.4.7.2.
   2. Where a range hood or down draft exhaust fan is used to satisfy the local ventilation requirements for kitchens, the range hood or down draft exhaust shall not be less than 100 cfm at 0.10 in. w.g.

3. Design and installation of the system or equipment shall be carried out in accordance with manufacturers' installation instructions.

[W] TABLE 403.4.7.2
PRESCRIPTIVE EXHAUST DUCT SIZING

FAN TESTED CFM AT 0.25 INCHES W.G.	MINIMUM FLEX DIAMETER	MAXIMUM LENGTH IN FEET	MINIMUM SMOOTH DIAMETER	MAXIMUM LENGTH IN FEET	MAXIMUM ELBOWS[a]
50	4 inches	25	4 inches	70	3
50	5 inches	90	5 inches	100	3
50	6 inches	No Limit	6 inches	No Limit	3
80	4 inches[b]	NA	4 inches	20	3
80	5 inches	15	5 inches	100	3
80	6 inches	90	6 inches	No Limit	3
100	5 inches[b]	NA	5 inches	50	3
100	6 inches	45	6 inches	No Limit	3
125	6 inches	15	6 inches	No Limit	3
125	7 inches	70	7 inches	No Limit	3

a. For each additional elbow, subtract 10 feet from length.
b. Flex ducts of this diameter are not permitted with fans of this size.

[S] SECTION 404
ENCLOSED PARKING GARAGES, LOADING DOCKS AND MOTOR VEHICLE REPAIR GARAGES

[S] 404.1 Enclosed parking garages. Mechanical ventilation systems for enclosed parking garages shall operate continuously or shall be automatically operated by means of carbon monoxide detectors applied in conjunction with nitrogen dioxide detectors. Such detectors shall be listed in accordance with UL 2075 and installed in accordance with their listing and the manufacturers' instructions. Loss of communication with the carbon monoxide or nitrogen dioxide detectors shall cause the exhaust fans to operate continuously at full-on design airflow. Automatic operation shall cycle the ventilation system between the following two modes of operation:

1. Full-on at an airflow rate of not less than 0.75 cfm per square foot [0.0038 $m^3/(s \cdot m^2)$] of the floor area served.
2. Standby at an airflow rate of not less than 0.05 cfm per square foot [0.00025 $m^3/(s \cdot m^2)$] of the floor area served.

404.2 Occupied spaces accessory to public garages. Connecting offices, waiting rooms, ticket booths, and similar uses that are accessory to a public garage shall be maintained at a positive pressure and shall be provided with ventilation in accordance with Section 403.3.1.

404.3 Enclosed loading dock. Mechanical ventilation systems for enclosed parking garages shall operate continuously or shall be automatically operated by means of carbon monoxide detectors applied in conjunction with nitrogen dioxide detectors. Such detectors shall be listed in accordance with UL 2075 and installed in accordance with their listing and the manufacturers' instructions. Loss of communication with the carbon monoxide or nitrogen dioxide detectors shall cause the exhaust fans to operate continuously at full-on design airflow. Automatic operation shall cycle the ventilation system between the following two modes of operation:

1. Full-on at an airflow rate of not less than 1.5 cfm per square foot [0.0076 $m^3/(s \cdot m^2)$] of the floor area served.
2. Standby at an airflow rate of not less than 0.03 cfm per square foot [0.00017 $m^3/(s \cdot m^2)$] of the floor area served.

404.4 Enclosed automated parking system areas. Mechanical ventilation systems for enclosed automated parking system areas where the engines of the motor vehicles are not operating shall operate continuously to provide a minimum airflow rate of 50 cfm per parking stall. This does not apply to the vehicle drop off area where vehicles are operating as these area shall comply with Section 404.1.

404.5 Motor vehicle repair garages. In buildings used for the repair of motor vehicles, each repair stall or stand shall be equipped with an exhaust capture system that connects directly to the repair engine exhaust source and prevents the escape of fumes. The exhaust system shall exhaust to the outdoor atmosphere. See Section 502.15 for additional requirements. Ventilation shall be provided for the motor vehicle repair garage in accordance with Section 404.1.

SECTION 405
SYSTEMS CONTROL

[S] 405.1 General. Mechanical ventilation systems shall be provided with manual or automatic controls that will operate such systems whenever the spaces are occupied. Air-conditioning systems that supply required *ventilation air* shall be provided with

controls designed to automatically maintain the required outdoor air supply rate during occupancy. Additional mechanical system control requirements are contained in the International Energy Conservation Code.

SECTION 406
VENTILATION OF UNINHABITED SPACES

[S] 406.1 General. ((~~Uninhabited spaces, such as crawl~~)) Crawl spaces and attics ((~~,~~)) shall be provided with *natural ventilation* openings as required by the *International Building Code* or shall be provided with a mechanical exhaust and supply air system. The mechanical exhaust rate shall be not less than 0.02 cfm per square foot (0.00001 $m^3/s \cdot m^2$) of horizontal area and shall be automatically controlled to operate when the relative humidity in the space served exceeds 60 percent.

SECTION 407
AMBULATORY CARE FACILITIES AND GROUP I-2 OCCUPANCIES

[W] 407.1 General. Mechanical ventilation for healthcare facilities licensed by Washington state shall be designed and installed in accordance with this code and the following provisions of the Washington Administrative Code (WAC):

1. Mechanical ventilation in ambulatory care facilities shall comply with chapter 246-330 WAC.
2. Mechanical ventilation for acute care hospitals shall comply with chapter 246-320 WAC.
3. Mechanical ventilation for nursing homes shall comply with chapter 388-97 WAC.

Mechanical ventilation for unlicensed ambulatory care facilities ((~~and Group I-2 *occupancies*~~)) shall be designed and installed in accordance with this code and ASHRAE 170.

CHAPTER 5

EXHAUST SYSTEMS

User note:

About this chapter: *Chapter 5 addresses exhaust systems for, among others, kitchens, laboratories, processes, garages, hazardous systems, clothes dryers and smoke control systems. Many provisions are linked to the* International Fire Code®. *Exhaust systems mitigate health and fire hazards by removing and diluting contaminants in buildings. Exhaust system discharge location is also addressed as an important concern.*

SECTION 501
GENERAL

501.1 Scope. This chapter shall govern the design, construction and installation of mechanical exhaust systems, including exhaust systems serving clothes dryers and cooking appliances; hazardous exhaust systems; dust, stock and refuse conveyor systems; subslab soil exhaust systems; smoke control systems; energy recovery ventilation systems and other systems specified in Section 502.

501.2 Independent system required. Single or combined mechanical exhaust systems for environmental air shall be independent of all other exhaust systems. Dryer exhaust shall be independent of all other systems. Type I exhaust systems shall be independent of all other exhaust systems except as provided in Section 506.3.5. Single or combined Type II exhaust systems for food-processing operations shall be independent of all other exhaust systems. Kitchen exhaust systems shall be constructed in accordance with Section 505 for domestic cooking operations and Sections 506 through 509 for commercial cooking operations.

[S] 501.3 Exhaust discharge. The air removed by every mechanical exhaust system shall be discharged outdoors at a point where it will not cause a public nuisance and not less than the distances specified in Section 501.3.1. The air shall be discharged to a location from which it cannot again be readily drawn in by a ventilating system. Air shall not be exhausted into an attic, crawl space, or be directed onto walkways.

Exceptions:

1. Whole-house ventilation-type attic fans shall be permitted to discharge into the attic space of *dwelling units* having private attics.
2. Commercial cooking recirculating systems are not required to discharge outdoors if the kitchen area has an exhaust system that is vented to the outside. Ventilation shall be provided in accordance with Chapter 4.
3. Where installed in accordance with the manufacturer's instructions and where mechanical or *natural ventilation* is otherwise provided in accordance with Chapter 4, *listed* and *labeled* domestic ductless range hoods shall not be required to discharge to the outdoors.

501.3.1 Location of exhaust outlets. The termination point of exhaust outlets and ducts discharging to the outdoors shall be located with the following minimum distances:

[W][S] 1. For ducts conveying explosive or flammable vapors, fumes or dusts: 30 feet (9144 mm) from property lines; 10 feet (3048 mm) from operable openings into ((~~buildings~~)) the building; 6 feet (1829 mm) from exterior walls and roofs; 30 feet (9144 mm) from combustible walls and operable openings into ((~~buildings that~~)) the building which are in the direction of the exhaust discharge; 10 feet (3048 mm) above adjoining grade.

Interpretation: Item 1 includes carpentry shop exhaust, industrial chemical lab, paint shop and sandblasting exhaust systems. For *clearances* and encroachments in the public right-of-way, see Section 304.13.

2. For other product-conveying outlets: 10 feet (3048 mm) from the property lines; 3 feet (914 mm) from exterior walls and roofs; 10 feet (3048 mm) from operable openings into buildings; 10 feet (3048 mm) above adjoining grade.

Interpretation: Item 2 includes central vacuum systems, dry cleaner, photo lab, school chemical lab, nail salon, dryer exhaust over 250° *source capture system* exhaust and *combustion* engine exhaust.

[W] 3. For all *environmental air* exhaust other than enclosed parking garage and transformer vault exhaust: 3 feet (914 mm) from property lines, ((;)) 3 feet (914 mm) from operable openings into buildings for all occupancies other than Group U, and 10 feet (3048 mm) from mechanical air intakes. Such exhaust shall not be considered hazardous or noxious.

Interpretation: For the purposes of this section, "lot line" includes any property line separating one lot from another lot, but does not include any property line separating a lot from a public street or alley right-of-way.

Exceptions:

1. The separation between an air intake and exhaust outlet on a single listed package HVAC unit.
2. Exhaust from environmental air systems other than garages may be discharged into an open parking garage.
3. Except for Group I occupancies, where ventilation system design circumstances require building HVAC air to be relieved, such as during economizer operation, such air may be relieved into an open or enclosed parking garage within the same building.

4. Exhaust outlets serving structures in flood hazard areas shall be installed at or above the elevation required by Section 1612 of the *International Building Code* for utilities and attendant equipment.

[W][S] 5. For enclosed parking garage, loading dock, and motor vehicle repair garage exhaust system outlets: Exhaust ventilation openings and duct terminations shall be located not less than 10 feet (3048 mm) from property lines which separate one lot from another; operable openings into buildings and mechanical air intakes; and 3 feet (914 mm) horizontally from, 10 feet above, or 10 feet below adjoining finished walking surfaces other than alleys. Exhaust outlets extending to the roof shall extend 3 feet (914 mm) above the roof surface.

[W] 6. For elevator machinery rooms in enclosed or open parking garages: Exhaust outlets may discharge air directly into the parking garage.

[S] 7. For transformer vault exhaust systems: Exhaust ventilation openings and duct terminations shall be located not less than 10 feet (3048 mm) from fire escapes, required means of egress at the exterior of the building, elements of the exit discharge, combustible exterior wall coverings, unprotected openings, operable openings and property lines other than a public way. Exhaust outlets shall be located on the exterior of the building. See Seattle Building Code Section 430 for additional requirements.

Note: See Seattle City Light Standard 751 Section 9 Ventilation for additional requirements.

((~~5~~)) 8. For specific systems, see the following sections:

((~~5.1~~)) 8.1. Clothes dryer exhaust, Section 504.4.

((~~5.2~~)) 8.2. Kitchen hoods and other kitchen exhaust *equipment*, Sections 506.3.13, 506.4 and 506.5.

((~~5.3~~)) 8.3. Dust, stock and refuse conveying systems, Section 511.2.

((~~5.4~~)) 8.4. Subslab soil exhaust systems, Section 512.4.

((~~5.5~~)) 8.5. Smoke control systems, Section 513.10.3.

((~~5.6~~)) 8.6. Refrigerant discharge, Section 1105.7.

((~~5.7~~)) 8.7. Machinery room discharge, Section 1105.6.1.

Note: *Seattle Land Use Code* (Municipal Code Title 23) requires that the venting of odors, vapors, smoke, cinders, dust, gas and fumes shall be at least 10 feet (3048 mm) above finished sidewalk grade, and directed away as much as possible from residential uses within 50 feet (15 240 mm) of the vent in some locations.

501.3.2 Exhaust opening protection. Exhaust openings that terminate outdoors shall be protected with corrosion- resistant screens, louvers or grilles. Openings in screens, louvers and grilles shall be sized not less than 1/4 inch (6.4 mm) and not larger than 1/2 inch (12.7 mm). Openings shall be protected against local weather conditions. Louvers that protect exhaust openings in structures located in hurricane-prone regions, as defined in the *International Building Code*, shall comply with AMCA Standard 550. Outdoor openings located in exterior walls shall meet the provisions for exterior wall opening protectives in accordance with the *International Building Code*.

[W] 501.4 Pressure equalization. Mechanical exhaust systems shall be sized to remove the quantity of air required by this chapter to be exhausted. The system shall operate when air is required to be exhausted. Where mechanical exhaust is required in a room or space, ((~~in other than occupancies in Group R-3 and *dwelling units* in Group R-2,~~)) such space shall be maintained with a neutral or negative pressure. If a greater quantity of air is supplied by a mechanical ventilating supply system than is removed by a mechanical exhaust for a room, adequate means shall be provided for the natural or mechanical exhaust of the excess air supplied. If only a mechanical exhaust system is installed for a room or if a greater quantity of air is removed by a mechanical exhaust system than is supplied by a mechanical ventilating supply system for a room, adequate *makeup air* shall be provided to satisfy the deficiency.

Exception: Intermittent domestic range exhaust, intermittent domestic dryer exhaust, and intermittent local exhaust system in R-3 occupancies and dwelling units in R-2 occupancies are excluded from the pressure equalization requirement unless required by Section 504 or Section 505.

501.5 Ducts. Where exhaust duct construction is not specified in this chapter, such construction shall comply with Chapter 6.

SECTION 502
REQUIRED SYSTEMS

[S] 502.1 General. An exhaust system shall be provided, maintained and operated as specifically required by this section and for all occupied areas where machines, vats, tanks, furnaces, forges, salamanders and other *appliances*, *equipment* and processes in such areas produce or throw off dust or particles sufficiently light to float in the air, or emit heat, odors, fumes, spray, gas or smoke in such quantities so as to be irritating or injurious to health or safety. These exhaust systems are considered *product-conveying* systems.

[S] 502.1.1 Exhaust inlet location. The inlet to an exhaust system shall be located in the area of heaviest concentration of contaminants.

[F] 502.1.2 Fuel-dispensing areas. The bottom of an air inlet or exhaust opening in fuel-dispensing areas shall be located not more than 18 inches (457 mm) above the floor.

502.1.3 Equipment, appliance and service rooms. *Equipment*, *appliance* and system service rooms that house sources of odors, fumes, noxious gases, smoke, steam, dust, spray or other contaminants shall be designed and constructed so as to prevent spreading of such contaminants to other occupied parts of the building.

[F] 502.1.4 Hazardous exhaust. The mechanical exhaust of high concentrations of dust or hazardous vapors shall conform to the requirements of Section 510.

[F] 502.2 Aircraft fueling and defueling. Compartments housing piping, pumps, air eliminators, water separators, hose reels and similar *equipment* used in aircraft fueling and defueling operations shall be adequately ventilated at floor level or within the floor itself.

[F] 502.3 Battery-charging areas for powered industrial trucks and equipment. Ventilation shall be provided in an *approved* manner in battery-charging areas for powered industrial trucks and *equipment* to prevent a dangerous accumulation of flammable gases.

[S][F] 502.4 Stationary storage battery systems. Stationary storage battery systems having a liquid capacity of more than 50 gallons shall be regulated and ventilated in accordance with Section 1206.2.11.3 of the *International Fire Code* and the general requirements of this chapter.

[F] 502.5 Ventilation of battery systems in cabinets. Stationary storage battery systems installed in cabinets shall be provided with ventilation in accordance with Section 502.4.

[F] 502.6 Dry cleaning plants. Ventilation in dry cleaning plants shall be adequate to protect employees and the public in accordance with this section and DOL 29 CFR Part 1910.1000, where applicable.

[F] 502.6.1 Type II systems. Type II dry cleaning systems shall be provided with a mechanical ventilation system that is designed to exhaust 1 cubic foot of air per minute for each square foot of floor area (1 cfm/ft^2) [0.00508 m^3/(s • m^2)] in dry cleaning rooms and in drying rooms. The ventilation system shall operate automatically when the dry cleaning *equipment* is in operation and shall have manual controls at an *approved* location.

[F] 502.6.2 Type IV and V systems. Type IV and V dry cleaning systems shall be provided with an automatically activated exhaust ventilation system to maintain an air velocity of not less than 100 feet per minute (0.51 m/s) through the loading door when the door is opened.

Exception: Dry cleaning units are not required to be provided with exhaust ventilation where an exhaust hood is installed immediately outside of and above the loading door and operates at an airflow rate as follows:

$$Q = 100 \times A_{LD} \qquad \textbf{(Equation 5-1)}$$

where:

Q = Flow rate exhausted through the hood, cubic feet per minute.

A_{LD} = Area of the loading door, square feet.

[F] 502.6.3 Spotting and pretreating. Scrubbing tubs, scouring, brushing or spotting operations shall be located such that solvent vapors are captured and exhausted by the ventilating system.

[S][F] 502.7 Application of flammable finishes. Mechanical exhaust as required by this section shall be provided for operations involving the application of flammable finishes. Spray finishing operations conducted in Group A, E, I or R *occupancies* shall be located in a spray room protected with an *approved* automatic sprinkler system installed in accordance with *International Building Code* Section 903.3.1.1 and separated vertically and horizontally from other areas in accordance with the *Inter-*

national Building Code. In other *occupancies*, spray-finishing operations shall be conducted in a spray room, spray booth or limited spraying area *approved* for such use.

[F] 502.7.1 During construction. Ventilation shall be provided for operations involving the application of materials containing flammable solvents in the course of construction, *alteration* or demolition of a structure.

[S][F] 502.7.2 Limited spraying spaces. Positive mechanical ventilation that provides not less than six complete air changes per hour shall be installed in limited spraying spaces. Such system shall meet the requirements of the *International Fire Code* for handling flammable vapors. Explosion venting is not required.

Exception: Negative mechanical ventilation, providing a minimum of six complete air changes per hour, is allowed in lieu of positive mechanical ventilation if a fan rated for Class I, Division 2 hazardous locations in accordance with the *Seattle Electrical Code* is installed.

[F] 502.7.3 Flammable vapor areas. Mechanical ventilation of flammable vapor areas shall be provided in accordance with Sections 502.7.3.1 through 502.7.3.6.

[F] 502.7.3.1 Operation. Mechanical ventilation shall be kept in operation at all times while spraying operations are being conducted and for a sufficient time thereafter to allow vapors from drying coated articles and finishing material residue to be exhausted. Spraying *equipment* shall be interlocked with the ventilation of the flammable vapor area such that spraying operations cannot be conducted unless the ventilation system is in operation.

[F] 502.7.3.2 Recirculation. Air exhausted from spraying operations shall not be recirculated.

Exceptions:

1. Air exhausted from spraying operations shall be permitted to be recirculated as *makeup air* for unmanned spray operations provided that:
   - 1.1. The solid particulate has been removed.
   - 1.2. The vapor concentration is less than 25 percent of the lower flammable limit (LFL).
   - 1.3. *Approved equipment* is used to monitor the vapor concentration.
   - 1.4. An alarm is sounded and spray operations are automatically shut down if the vapor concentration exceeds 25 percent of the LFL.
   - 1.5. In the event of shutdown of the vapor concentration monitor, 100 percent of the air volume specified in Section 510 is automatically exhausted.
2. Air exhausted from spraying operations is allowed to be recirculated as *makeup air* to manned spraying operations where all of the conditions provided in Exception 1 are included in the installation and documents have been prepared to show that the installation does not pose a life safety hazard to personnel inside the spray booth, spraying space or spray room.

[F] 502.7.3.3 Air velocity. The ventilation system shall be designed, installed and maintained so that the flammable contaminants are diluted in noncontaminated air to maintain concentrations in the exhaust air flow below 25 percent of the contaminant's lower flammable limit (LFL). In addition, the spray booth shall be provided with mechanical ventilation so that the average air velocity through openings is in accordance with Sections 502.7.3.3.1 and 502.7.3.3.2.

[F] 502.7.3.3.1 Open face or open front spray booth. For spray application operations conducted in an open face or open front spray booth, the ventilation system shall be designed, installed and maintained so that the average air velocity into the spray booth through all openings is not less than 100 feet per minute (0.51 m/s).

Exception: For fixed or automated electrostatic spray application equipment, the average air velocity into the spray booth through all openings shall be not less than 50 feet per minute (0.25 m/s).

[F] 502.7.3.3.2 Enclosed spray booth or spray room with openings for product conveyance. For spray application operations conducted in an enclosed spray booth or spray room with openings for product conveyance, the ventilation system shall be designed, installed and maintained so that the average air velocity into the spray booth through openings is not less than 100 feet per minute (0.51 m/s).

Exceptions:

1. For fixed or automated electrostatic spray application equipment, the average air velocity into the spray booth through all openings shall be not less than 50 feet per minute (0.25 m/s).
2. Where methods are used to reduce cross drafts that can draw vapors and overspray through openings from the spray booth or spray room, the average air velocity into the spray booth or spray room shall be that necessary to capture and confine vapors and overspray to the spray booth or spray room.

[F] 502.7.3.4 Ventilation obstruction. Articles being sprayed shall be positioned in a manner that does not obstruct collection of overspray.

[F] 502.10.3 Treatment systems. Treatment systems for highly toxic and toxic gases shall comply with the *International Fire Code*.

502.11 Motion picture projectors. Motion picture projectors shall be exhausted in accordance with Section 502.11.1 or 502.11.2.

502.11.1 Projectors with an exhaust discharge. Projectors equipped with an exhaust discharge shall be directly connected to a mechanical exhaust system. The exhaust system shall operate at an exhaust rate as indicated by the manufacturer's installation instructions.

502.11.2 Projectors without exhaust connection. Projectors without an exhaust connection shall have contaminants exhausted through a mechanical exhaust system. The exhaust rate for electric arc projectors shall be not less than 200 cubic feet per minute (cfm) (0.09 m^3/s) per lamp. The exhaust rate for xenon projectors shall be not less than 300 cfm (0.14 m^3/s) per lamp. Xenon projector exhaust shall be at a rate such that the exterior temperature of the lamp housing does not exceed 130°F (54°C). The lamp and projection room exhaust systems, whether combined or independent, shall not be interconnected with any other exhaust or return system within the building.

[F] 502.12 Organic coating processes. Enclosed structures involving organic coating processes in which Class I liquids are processed or handled shall be ventilated at a rate of not less than 1 cfm/ft^2 [0.00508 $m^3/(s \cdot m^2)$] of solid floor area. Ventilation shall be accomplished by exhaust fans that intake at floor levels and discharge to a safe location outside the structure. Noncontaminated intake air shall be introduced in such a manner that all portions of solid floor areas are provided with continuous uniformly distributed air movement.

502.13 Public garages. Mechanical exhaust systems for public garages, as required in Chapter 4, shall operate continuously or in accordance with Section 404.

[S] 502.14 Motor vehicle operation. In areas where motor vehicles operate, mechanical ventilation shall be provided in accordance with Section 403. Additionally, areas in which stationary motor vehicles are operated shall be provided with a *source capture system* that connects directly to the motor vehicle exhaust systems. When the *source capture system* extends more than 10 feet from the tailpipe connection to the outdoors, the system shall exhaust at a rate of 600 cfm for heavy-duty diesel vehicles and at a rate of 300 cfm for all other vehicles. Such system shall be engineered by a registered design professional. ((~~or shall be factory-built equipment designed and sized for the purpose.~~))

Exceptions:

1. This section shall not apply where the motor vehicles being operated or repaired are electrically powered.
2. This section shall not apply to one- and two-family dwellings.
3. This section shall not apply to motor vehicle service areas where engines are operated inside the building only for the duration necessary to move the motor vehicles in and out of the building.

[S][F] 502.15 Repair garages and other spaces. Where Class I liquids or LP-gas are stored or used within a building having a basement or pit wherein flammable vapors could accumulate, the basement or pit shall be provided with ventilation designed to prevent the accumulation of flammable vapors therein.

[F] 502.16 Repair garages for vehicles fueled by lighter-than-air fuels. Repair garages used for the conversion and repair of vehicles that use compressed natural gas, liquefied natural gas, hydrogen or other lighter-than-air motor fuels shall be provided with an *approved* mechanical exhaust ventilation system. The mechanical exhaust ventilation system shall be in accordance with Section 502.16.1 or 502.16.2 as applicable.

Exceptions:

1. Repair garages where work is not performed on the fuel system and is limited to exchange of parts and maintenance not requiring open flame or welding on the compressed natural gas, liquefied natural gas, hydrogen or other lighter-than-air-fueled motor vehicle.
2. Repair garages for hydrogen-fueled vehicles where work is not performed on the hydrogen storage tank and is limited to the exchange of parts and maintenance not requiring open flame or welding on the hydrogen-fueled vehicle. During the work, the entire hydrogen fuel system shall contain a quantity of hydrogen that is less than 200 cubic feet (5.6 m^3).

[F] 502.16.1 Repair garages for hydrogen-fueled vehicles. Repair garages used for the repair of hydrogen-fueled vehicles shall be provided with an approved exhaust ventilation system in accordance with this code and Chapter 6 of NFPA 2.

[F] 502.16.2 Exhaust ventilation system. Repair garages used for the repair of compressed natural gas, liquefied natural gas or other lighter-than-air motor fuel, other than hydrogen, shall be provided with an approved mechanical exhaust ventilation system. The mechanical exhaust ventilation system shall be in accordance with this code and Sections 502.16.2.1 and 502.16.2.2.

Exception: Where approved, natural ventilation shall be an alternative to mechanical exhaust ventilation.

[F] 502.16.2.1 Design. For indoor locations, air supply inlets and exhaust outlets for mechanical ventilation shall be arranged to provide uniformly distributed air movement with inlets uniformly arranged on walls near floor level and outlets located at the high point of the room in walls or the roof.

Failure of the exhaust ventilation system shall cause the fueling system to shut down.

The exhaust ventilation rate shall be not less than 1 cubic foot per minute (0.03 m^3/min) per 12 cubic feet (0.34 m^3) of room volume.

[F] 502.16.2.2 Operation. The mechanical exhaust ventilation system shall operate continuously.

Exceptions:

1. Mechanical exhaust ventilation systems that are interlocked with a gas detection system designed in accordance with the *International Fire Code*.
2. Mechanical exhaust ventilation systems in garages that are used only for the repair of vehicles fueled by liquid fuels or odorized gases, such as compressed natural gas, where the exhaust ventilation system is electrically interlocked with the lighting circuit.

502.17 Tire rebuilding or recapping. Each room where rubber cement is used or mixed, or where flammable or combustible solvents are applied, shall be ventilated in accordance with the applicable provisions of NFPA 91.

502.17.1 Buffing machines. Each buffing machine shall be connected to a dust-collecting system that prevents the accumulation of the dust produced by the buffing process.

502.18 Specific rooms. Specific rooms, including bathrooms, locker rooms, smoking lounges and toilet rooms, shall be exhausted in accordance with the ventilation requirements of Chapter 4.

Informative Note: RCW 70.160.030 states: "No person may smoke in a public place or in any place of employment." A public place is defined in RCW 70.160.020 in part as: "…A public place does not include a private residence unless the private residence is used to provide licensed child care, foster care, adult care, or other similar social service care on the premises. This chapter is not intended to restrict smoking in private facilities which are occasionally open to the public except upon the occasions when the facility is open to the public."

502.19 Indoor firing ranges. Ventilation shall be provided in an *approved* manner in areas utilized as indoor firing ranges. Ventilation shall be designed to protect employees and the public in accordance with DOL 29 CFR 1910.1025 where applicable.

502.20 Manicure and pedicure stations. Manicure and pedicure stations shall be provided with an exhaust system in accordance with Table 403.3.1.1, Note h. Manicure tables and pedicure stations not provided with factory-installed exhaust inlets shall be provided with exhaust inlets located not more than 12 inches (305 mm) horizontally and vertically from the point of chemical application.

SECTION 503
MOTORS AND FANS

503.1 General. Motors and fans shall be sized to provide the required air movement. Motors in areas that contain flammable vapors or dusts shall be of a type *approved* for such environments. A manually operated remote control installed at an *approved* location shall be provided to shut off fans or blowers in flammable vapor or dust systems. Electrical *equipment* and appliances used in operations that generate explosive or flammable vapors, fumes or dusts shall be interlocked with the ventilation system so that the *equipment* and appliances cannot be operated unless the ventilation fans are in operation. Motors for fans used to convey flammable vapors or dusts shall be located outside the duct or shall be protected with *approved* shields and dustproofing. Motors and fans shall be provided with a means of access for servicing and maintenance.

503.2 Fans. Parts of fans in contact with explosive or flammable vapors, fumes or dusts shall be of nonferrous or nonsparking materials, or their casing shall be lined or constructed of such material. Where the size and hardness of materials passing through a fan are capable of producing a spark, both the fan and the casing shall be of nonsparking materials. Where fans are required to be spark resistant, their bearings shall not be within the airstream, and all parts of the fan shall be grounded. Fans in systems-handling materials that are capable of clogging the blades, and fans in buffing or woodworking exhaust systems, shall be of the radial-blade or tube-axial type.

503.3 Equipment and appliance identification plate. *Equipment* and appliances used to exhaust explosive or flammable vapors, fumes or dusts shall bear an identification plate stating the ventilation rate for which the system was designed.

503.4 Corrosion-resistant fans. Fans located in systems conveying corrosives shall be of materials that are resistant to the corrosive or shall be coated with corrosion-resistant materials.

SECTION 504
CLOTHES DRYER EXHAUST

504.1 Installation. Clothes dryers shall be exhausted in accordance with the manufacturer's instructions. Dryer exhaust systems shall be independent of all other systems and shall convey the moisture and any products of *combustion* to the outside of the building.

Exception: This section shall not apply to *listed* and *labeled* condensing (ductless) clothes dryers.

504.2 Exhaust penetrations. Where a clothes dryer exhaust duct penetrates a wall or ceiling membrane, the annular space shall be sealed with noncombustible material, *approved* fire caulking or a noncombustible dryer exhaust duct wall receptacle. Ducts that exhaust clothes dryers shall not penetrate or be located within any fireblocking, draftstopping or any wall, floor/ceiling or other assembly required by the *International Building Code* to be fire-resistance rated, unless such duct is constructed of galvanized steel or aluminum of the thickness specified in Section 603.4 and the fire-resistance rating is maintained in accordance with the *International Building Code*. Fire dampers, combination fire/smoke dampers and any similar devices that will obstruct the exhaust flow shall be prohibited in clothes dryer exhaust ducts.

[S] 504.2.1 Protection required. Protective shield plates shall be placed where nails or screws from finish or other work are likely to penetrate the clothes dryer exhaust duct. Shield plates shall be placed on the finished face of all framing members where there is less than 1-1/4 inches (32 mm) between the duct and the finished face of the framing member. Protective shield plates shall be constructed of steel, have a thickness of 0.062 inch (1.6 mm) and extend a minimum of 2 inches (51 mm) above sole plates and below top plates.

504.3 Cleanout. Each vertical riser shall be provided with a means for cleanout.

[W] 504.4 Exhaust installation. Dryer exhaust ducts for clothes dryers shall terminate on the outside of the building and shall be equipped with a backdraft damper located where the duct terminates. Dryer exhaust ducts may terminate at exterior wall louvers with openings spaced not less than 1/2" in any direction. Screens shall not be installed at the duct termination. Ducts shall not be connected or installed with sheet metal screws or other fasteners that will obstruct the exhaust flow. Clothes dryer exhaust ducts shall not be connected to a vent connector, vent or *chimney*. Clothes dryer exhaust ducts shall not extend into or through ducts or plenums. ((~~Clothes dryer exhaust ducts shall be sealed in accordance with Section 603.9.~~)) Domestic dryer exhaust ducts may terminate at a common exhaust location where each duct has an independent back-draft damper.

504.4.1 Exhaust termination outlet and passageway size. The passageway of dryer exhaust duct terminals shall be undiminished in size and shall provide an open area of not less than 12.5 square inches (8065 mm^2).

504.5 Dryer exhaust duct power ventilators. Domestic dryer exhaust duct power ventilators shall be listed and labeled to UL 705 for use in dryer exhaust duct systems. The dryer exhaust duct power ventilator shall be installed in accordance with the manufacturer's instructions.

504.6 Makeup air. Installations exhausting more than 200 cfm (0.09 m^3/s) shall be provided with *makeup air*. Where a closet is designed for the installation of a clothes dryer, an opening having an area of not less than 100 square inches (0.0645 m^2) shall be provided in the closet enclosure or *makeup air* shall be provided by other *approved* means.

[S] ((~~504.7 Protection required.~~ ~~Protective shield plates shall be placed where nails or screws from finish or other work are likely to penetrate the clothes dryer exhaust duct. Shield plates shall be placed on the finished face of all framing members where there is less than 1-1/4 inches (32 mm) between the duct and the finished face of the framing member. Protective shield plates shall be constructed of steel, have a thickness of 0.062 inch (1.6 mm) and extend not less than 2 inches (51 mm) above sole plates and below top plates.~~))

[S] ((~~504.8~~)) 504.7 Domestic clothes dryer ducts. Exhaust ducts for domestic clothes dryers shall conform to the requirements of Sections ((~~504.8.1~~)) 504.7.1 through ((~~504.8.6~~)) 504.7.6 and Section 504.2.1.

[S] ((~~504.8.1~~)) 504.7.1 Material and size. Exhaust ducts shall have a smooth interior finish and shall be constructed of metal not less than 0.016 inch (0.4 mm) in thickness. The exhaust duct size shall be 4 inches (102 mm) nominal in diameter.

[S] ((~~504.8.2~~)) 504.7.2 Duct installation. Exhaust ducts shall be supported at 4-foot (1219 mm) intervals and secured in place. The insert end of the duct shall extend into the adjoining duct or fitting in the direction of airflow. Ducts shall not be joined with screws or similar fasteners that protrude more than 1/8 inch (3.2 mm) into the inside of the duct.

Where dryer exhaust ducts are enclosed in wall or ceiling cavities, such cavities shall allow the installation of the duct without deformation.

[S] ((~~504.8.3~~)) 504.7.3 Transition ducts. Transition ducts used to connect the dryer to the exhaust duct system shall be a single length that is *listed* and *labeled* in accordance with UL 2158A. Transition ducts shall be not greater than 8 feet (2438 mm) in length and shall not be concealed within construction.

[S] ((~~504.8.4~~)) 504.7.4 Duct length. The maximum allowable exhaust duct length shall be determined by one of the methods specified in Sections ((~~504.8.4.1 through 504.8.4.3~~)) 504.7.4.1 and 504.7.4.2.

[S] ((~~504.8.4.1 Specified length.~~ ~~The maximum length of the exhaust duct shall be 35 feet (10 668 mm) from the connection to the transition duct from the dryer to the outlet terminal. Where fittings are used, the maximum length of the exhaust duct shall be reduced in accordance with Table 504.8.4.1.~~))

[S] TABLE ((~~504.8.4.1~~)) 504.7.4.1
DRYER EXHAUST DUCT FITTING EQUIVALENT LENGTH

DRYER EXHAUST DUCT FITTING TYPE	EQUIVALENT LENGTH
4" radius mitered 45-degree elbow	2 feet 6 inches
4" radius mitered 90-degree elbow	5 feet
6" radius smooth 45-degree elbow	1 foot
6" radius smooth 90-degree elbow	1 foot 9 inches
8" radius smooth 45-degree elbow	1 foot
8" radius smooth 90-degree elbow	1 foot 7 inches
10" radius smooth 45-degree elbow	9 inches
10" radius smooth 90-degree elbow	1 foot 6 inches

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.0175 rad.

[S] ((~~504.8.4.2~~)) 504.7.4.1 Manufacturer's instructions. The maximum length of the exhaust duct shall be determined by the dryer manufacturer's installation instructions. The code official shall be provided with a copy of the installation instructions for the make and model of the dryer. Where the exhaust duct is to be concealed, the installation instructions shall be provided to the code official prior to the concealment inspection. In the absence of fitting equivalent length calculations from the clothes dryer manufacturer, Table ((~~504.8.4.1~~)) 504.7.4.1 shall be used.

[S] ((~~504.8.4.3~~)) 504.7.4.2 Dryer exhaust duct power ventilator length. The maximum length of the exhaust duct shall be determined by the dryer exhaust duct power ventilator manufacturer's installation instructions.

[S] ((~~504.8.5~~)) 504.7.5 Length identification. Where the exhaust duct equivalent length exceeds 35 feet (10 668 mm), the equivalent length of the exhaust duct shall be identified on a permanent label or tag. The label or tag shall be located within 6 feet (1829 mm) of the exhaust duct connection.

[S] ((~~504.8.6~~)) 504.7.6 Exhaust duct required. Where space for a clothes dryer is provided, an exhaust duct system shall be installed. Where the clothes dryer is not installed at the time of occupancy, the exhaust duct shall be capped at the location of the future dryer.

Exception: Where a *listed* condensing clothes dryer is installed prior to occupancy of structure.

[S] ((~~504.9~~)) 504.8 Commercial clothes dryers. The installation of dryer exhaust ducts serving commercial clothes dryers shall comply with the *appliance* manufacturer's installation instructions. Exhaust fan motors installed in exhaust systems shall be located outside of the airstream. In multiple installations, the fan shall operate continuously or be interlocked to operate when any individual unit is operating. Ducts shall have a minimum *clearance* of 6 inches (152 mm) to combustible materials. Clothes dryer transition ducts used to connect the *appliance* to the exhaust duct system shall be limited to single lengths not to exceed 8 feet (2438 mm) in length and shall be *listed* and *labeled* for the application. Transition ducts shall not be concealed within construction.

[S] ((~~504.10~~)) 504.9 Common exhaust systems for clothes dryers located in multistory structures. Where a common multistory duct system is designed and installed to convey exhaust from multiple clothes dryers, the construction of the system shall be in accordance with all of the following:

1. The shaft in which the duct is installed shall be constructed and fire-resistance rated as required by the *International Building Code*.
2. Dampers shall be prohibited in the exhaust duct. Penetrations of the shaft and ductwork shall be protected in accordance with Section 607.5.5, Exception 2.
3. Rigid metal ductwork shall be installed within the shaft to convey the exhaust. The ductwork shall be constructed of sheet steel having a minimum thickness of 0.0187 inch (0.4712 mm) (No. 26 gage) and in accordance with SMACNA *Duct Construction Standards*.
4. The ductwork within the shaft shall be designed and installed without offsets.
5. The exhaust fan motor design shall be in accordance with Section 503.2.
6. The exhaust fan motor shall be located outside of the airstream.
7. The exhaust fan shall run continuously, and shall be connected to a legally required standby power source.
8. Exhaust fan operation shall be monitored in an *approved* location and shall initiate an audible or visual signal when the fan is not in operation.
9. Makeup air shall be provided for the exhaust system to maintain the minimum flow for the exhaust fan when the dryers are not operating. Additionally, *makeup air* shall be provided when required by Section 504.6.
10. A cleanout opening shall be located at the base of the shaft to provide *access* to the duct to allow for cleaning and inspection. The finished opening shall be not less than 12 inches by 12 inches (305 mm by 305 mm).

11. Screens shall not be installed at the termination.
12. The common multistory duct system shall serve only clothes dryers and shall be independent of other exhaust systems.

SECTION 505
DOMESTIC COOKING EXHAUST EQUIPMENT

505.1 General. Domestic cooking exhaust equipment shall comply with the requirements of this section.

505.2 Domestic cooking exhaust. Where domestic cooking exhaust equipment is provided, it shall comply with the following as applicable:

1. The fan for overhead range hoods and downdraft exhaust equipment not integral with the cooking appliance shall be listed and labeled in accordance with UL 507.
2. Overhead range hoods and downdraft exhaust equipment with integral fans shall comply with UL 507.
3. Domestic cooking appliances with integral downdraft exhaust equipment shall be listed and labeled in accordance with UL 858 or ANSI Z21.1.
4. Microwave ovens with integral exhaust for installation over the cooking surface shall be listed and labeled in accordance with UL 923.

[S] 505.3 Exhaust ducts. Domestic cooking exhaust equipment shall discharge to the outdoors through sheet metal ducts constructed of galvanized steel, stainless steel, aluminum or copper. Such ducts shall have smooth inner walls, shall be air tight, shall be equipped with a backdraft damper, and shall be independent of all other exhaust systems. Installations in Group I-1 and I-2 occupancies shall be in accordance with the *International Building Code* and Section 904.13 of the *International Fire Code*.

Domestic kitchen exhaust ducts may terminate with other domestic dryer exhaust and residential local exhaust ducts at a common location where each duct has an independent backdraft damper.

Listed and labeled exhaust booster fans shall be permitted when installed in accordance with the manufacturer's installation instructions.

Exceptions:

1. In other than Groups I-1 and I-2, where installed in accordance with the manufacturer's instructions and where mechanical or natural ventilation is otherwise provided in accordance with Chapter 4, listed and labeled ductless range hoods shall not be required to discharge to the outdoors. The local exhaust from the residential dwelling or sleeping unit kitchen area may be combined with the local bathroom exhaust ductwork where the exhaust register/grille in the kitchen is a minimum of 6 feet from the domestic range cooktop. The exhaust register/grille shall be provided with a minimum MERV 3 filter or mesh filter (washable) for trapping grease.

Interpretation: Chapter 4 requires separate *local exhaust* systems in kitchens, including where ductless range hoods (also known as recirculating hoods) are used. Ductless range hoods are permitted in *dwelling units* where exhaust systems in the kitchen meet the requirements for *local exhaust.* In no case is *natural ventilation*, such as an operable window, allowed to substitute for the required kitchen *local exhaust* system.

2. Ducts for domestic kitchen cooking appliances equipped with downdraft exhaust systems shall be permitted to be constructed of Schedule 40 PVC pipe and fittings provided that the installation complies with all of the following:
   - 2.1. The duct shall be installed under a concrete slab poured on grade.
   - 2.2. The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel.
   - 2.3. The PVC duct shall extend not more than 1 inch (25 mm) above the indoor concrete floor surface.
   - 2.4. The PVC duct shall extend not more than 1 inch (25 mm) above grade outside of the building.
   - 2.5. The PVC ducts shall be solvent cemented.

505.4 Makeup air required. Exhaust hood systems capable of exhausting in excess of 400 cfm (0.19 m^3/s) shall be provided with *makeup air* at a rate approximately equal to the *exhaust air* rate. Such *makeup air* systems shall be equipped with a means of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system.

[S] 505.5 Common exhaust systems for domestic kitchens located in multistory structures. Where a common multistory duct system is designed and installed to convey exhaust from multiple domestic kitchen exhaust systems, the construction of the system shall be in accordance with all of the following:

1. The shaft in which the duct is installed shall be constructed and fire-resistance rated as required by the *International Building Code*.
2. Dampers shall be prohibited in the exhaust duct, except as specified in Section 505.3. Penetrations of the shaft and ductwork shall be protected in accordance with Section 607.5.5, Exception 2.

3. Rigid metal ductwork shall be installed within the shaft to convey the exhaust. The ductwork shall be constructed of sheet steel having a minimum thickness of 0.0187 inch (0.4712 mm) (No. 26 gage) and in accordance with SMACNA *Duct Construction Standards*.
4. The ductwork within the shaft shall be designed and installed without offsets.
5. The exhaust fan motor design shall be in accordance with Section 503.2.
6. The exhaust fan motor shall be located outside of the airstream.
7. The exhaust fan shall run continuously, and shall be connected to a standby power source.
8. Exhaust fan operation shall be monitored in an approved location and shall initiate an audible or visual signal when the fan is not in operation.
9. Where the exhaust rate for an individual kitchen exceeds 400 cfm (0.19 m^3/s) makeup air shall be provided in accordance with Section 505.4.
10. A cleanout opening shall be located at the base of the shaft to provide access to the duct to allow for cleanout and inspection. The finished openings shall be not less than 12 inches by 12 inches (305 mm by 305 mm).
11. Screens shall not be installed at the termination.
12. The common multistory duct system shall serve only kitchen exhaust and shall be independent of other exhaust systems.

Exception: Where labeled ductless range hoods are provided the local exhaust from the residential dwelling or sleeping unit kitchen area may be combined with the local bathroom exhaust ductwork where the exhaust register/grille in the kitchen is a minimum of 6 feet from the domestic range cooktop. The exhaust register/grille shall be provided with a minimum MERV 3 filter or mesh filter (washable) for trapping grease.

505.6 Other than Group R. In other than Group R occupancies, where domestic cooktops, ranges, and open-top broilers are used for domestic purposes, domestic cooking exhaust systems shall be provided.

SECTION 506
COMMERCIAL KITCHEN HOOD VENTILATION SYSTEM DUCTS AND EXHAUST EQUIPMENT

506.1 General. Commercial kitchen hood ventilation ducts and exhaust *equipment* shall comply with the requirements of this section. Commercial kitchen grease ducts shall be designed for the type of cooking *appliance* and hood served.

506.2 Corrosion protection. Ducts exposed to the outside atmosphere or subject to a corrosive environment shall be protected against corrosion in an *approved* manner.

506.3 Ducts serving Type I hoods. Type I exhaust ducts shall be independent of all other exhaust systems except as provided in Section 506.3.5. Commercial kitchen duct systems serving Type I hoods shall be designed, constructed and installed in accordance with Sections 506.3.1 through 506.3.13.3.

506.3.1 Duct materials. Ducts serving Type I hoods shall be constructed of materials in accordance with Sections 506.3.1.1 and 506.3.1.2.

506.3.1.1 Grease duct materials. Grease ducts serving Type I hoods shall be constructed of steel having a minimum thickness of 0.0575 inch (1.463 mm) (No. 16 gage) or stainless steel not less than 0.0450 inch (1.14 mm) (No. 18 gage) in thickness.

Exception: Factory-built commercial kitchen grease ducts *listed* and *labeled* in accordance with UL 1978 and installed in accordance with Section 304.1.

506.3.1.2 Makeup air ducts. Makeup air ducts connecting to or within 18 inches (457 mm) of a Type I hood shall be constructed and installed in accordance with Sections 603.1, 603.3, 603.4, 603.9, 603.10 and 603.12. Duct insulation installed within 18 inches (457 mm) of a Type I hood shall be noncombustible or shall be *listed* for the application.

506.3.2 Joints, seams and penetrations of grease ducts. Joints, seams and penetrations of grease ducts shall be made with a continuous liquid-tight weld or braze made on the external surface of the duct system.

Exceptions:

1. Penetrations shall not be required to be welded or brazed where sealed by devices that are *listed* for the application.
2. Internal welding or brazing shall not be prohibited provided that the joint is formed or ground smooth and is provided with ready access for inspection.
3. Factory-built commercial kitchen grease ducts *listed* and *labeled* in accordance with UL 1978 and installed in accordance with Section 304.1.

506.3.2.1 Duct joint types. Duct joints shall be butt joints, welded flange joints with a maximum flange depth of 1/2 inch (12.7 mm) or overlapping duct joints of either the telescoping or bell type. Overlapping joints shall be installed to prevent

ledges and obstructions from collecting grease or interfering with gravity drainage to the intended collection point. The difference between the inside cross-sectional dimensions of overlapping sections of duct shall not exceed 1/4 inch (6.4 mm). The length of overlap for overlapping duct joints shall not exceed 2 inches (51 mm).

506.3.2.2 Duct-to-hood joints. Duct-to-hood joints shall be made with continuous internal or external liquid-tight welded or brazed joints. Such joints shall be smooth, accessible for inspection, and without grease traps.

Exceptions: This section shall not apply to:

1. A vertical duct-to-hood collar connection made in the top plane of the hood in accordance with all of the following:
   - 1.1. The hood duct opening shall have a 1-inch-deep (25 mm), full perimeter, welded flange turned down into the hood interior at an angle of 90 degrees (1.57 rad) from the plane of the opening.
   - 1.2. The duct shall have a 1-inch-deep (25 mm) flange made by a 1-inch by 1-inch (25 mm by 25 mm) angle iron welded to the full perimeter of the duct not less than 1 inch (25 mm) above the bottom end of the duct.
   - 1.3. A gasket rated for use at not less than 1500ºF (816ºC) is installed between the duct flange and the top of the hood.
   - 1.4. The duct-to-hood joint shall be secured by stud bolts not less than 1/4 inch (6.4 mm) in diameter welded to the hood with a spacing not greater than 4 inches (102 mm) on center for the full perimeter of the opening. The bolts and nuts shall be secured with lockwashers.
2. *Listed* and *labeled* duct-to-hood collar connections installed in accordance with Section 304.1.

506.3.2.3 Duct-to-exhaust fan connections. Duct-to-exhaust fan connections shall be flanged and gasketed at the base of the fan for vertical discharge fans; shall be flanged, gasketed and bolted to the inlet of the fan for side-inlet utility fans; and shall be flanged, gasketed and bolted to the inlet and outlet of the fan for in-line fans. Gasket and sealing materials shall be rated for continuous duty at a temperature of not less than 1500ºF (816ºC).

[W] 506.3.2.4 Vibration isolation. A vibration isolation connector for connecting a duct to a fan shall consist of noncombustible packing in a metal sleeve joint of *approved* design or shall be a coated-fabric flexible duct connector ((~~*listed* and *labeled* for the application~~)) rated for continuous duty at temperature of not less than 1500°F (816°C). Vibration isolation connectors shall be installed only at the connection of a duct to a fan inlet or outlet.

506.3.2.5 Grease duct test. Prior to the use or concealment of any portion of a grease duct system, a leakage test shall be performed. Ducts shall be considered to be concealed where installed in shafts or covered by coatings or wraps that prevent the ductwork from being visually inspected on all sides. The permit holder shall be responsible to provide the necessary *equipment* and perform the grease duct leakage test. A light test shall be performed to determine that all welded and brazed joints are liquid tight.

A light test shall be performed by passing a lamp having a power rating of not less than 100 watts through the entire section of ductwork to be tested. The lamp shall be open so as to emit light equally in all directions perpendicular to the duct walls. A test shall be performed for the entire duct system, including the hood-to-duct connection. The duct work shall be permitted to be tested in sections, provided that every joint is tested. For *listed* factory-built grease ducts, this test shall be limited to duct joints assembled in the field and shall exclude factory welds.

506.3.3 Grease duct supports. Grease duct bracing and supports shall be of noncombustible material securely attached to the structure and designed to carry gravity and seismic loads within the stress limitations of the *International Building Code*. Bolts, screws, rivets and other mechanical fasteners shall not penetrate duct walls.

506.3.4 Air velocity. Grease duct systems serving a Type I hood shall be designed and installed to provide an air velocity within the duct system of not less than 500 feet per minute (2.5 m/s).

Exception: The velocity limitations shall not apply within duct transitions utilized to connect ducts to differently sized or shaped openings in hoods and fans, provided that such transitions do not exceed 3 feet (914 mm) in length and are designed to prevent the trapping of grease.

[S] 506.3.5 Separation of grease duct system. A separate grease duct system shall be provided for each Type I hood. ((~~A separate grease duct system is not required~~)) Multiple Type I hoods are permitted to be combined where all of the following conditions are met:

1. All interconnected hoods are located within the same story.
2. All interconnected hoods are located within the same room or in adjoining rooms.
3. Interconnecting ducts do not penetrate assemblies required to be fire-resistance rated.
4. The grease duct system does not serve solid-fuel-fired appliances.

506.3.6 Grease duct clearances. Where enclosures are not required, grease duct systems and exhaust *equipment* serving a Type I hood shall have a *clearance* to combustible construction of not less than 18 inches (457 mm), and shall have a *clearance* to noncombustible construction and gypsum wallboard attached to noncombustible structures of not less than 3 inches (76 mm).

Exceptions:

1. Factory-built commercial kitchen grease ducts *listed* and *labeled* in accordance with UL 1978.
2. *Listed* and *labeled* exhaust *equipment* installed in accordance with Section 304.1.
3. Where commercial kitchen grease ducts are continuously covered on all sides with a *listed* and *labeled* field-applied grease duct enclosure material, system, product or method of construction specifically evaluated for such purpose in accordance with ASTM E2336, the required *clearance* shall be in accordance with the listing of such material, system, product or method.

[S] 506.3.7 Prevention of grease accumulation in grease ducts. Duct systems serving a Type I hood shall be constructed and installed so that grease cannot collect in any portion thereof, and the system shall slope not less than one-fourth unit vertical in 12 units horizontal (2-percent slope) toward the hood or toward a grease reservoir designed and installed in accordance with Section 506.3.7.1. Where horizontal ducts exceed 75 feet (22 860 mm) in length, the slope shall be not less than one unit vertical in 12 units horizontal (8.3-percent slope). Obstructions in the ductwork, such as duct-mounted sound attenuators or perforated acoustical louvers, are required to be listed and labeled per NFPA 96, UL 1978, or other applicable standard approved by the code official.

506.3.7.1 Grease duct reservoirs. Grease duct reservoirs shall:

1. Be constructed as required for the grease duct they serve.
2. Be located on the bottom of the horizontal duct or the bottommost section of the duct riser.
3. Extend across the full width of the duct and have a length of not less than 12 inches (305 mm).
4. Have a depth of not less than 1 inch (25 mm).
5. Have a bottom that slopes to a drain.
6. Be provided with a cleanout opening constructed in accordance with Section 506.3.8 and installed to provide direct access to the reservoir. The cleanout opening shall be located on a side or on top of the duct so as to permit cleaning of the reservoir.
7. Be installed in accordance with the manufacturer's instructions where manufactured devices are utilized.

506.3.8 Grease duct cleanouts and openings. Grease duct cleanouts and openings shall comply with all of the following:

1. Grease ducts shall not have openings except where required for the operation and maintenance of the system.
2. Sections of grease ducts that are inaccessible from the hood or discharge openings shall be provided with cleanout openings spaced not more than 20 feet (6096 mm) apart and not more than 10 feet (3048 mm) from changes in direction greater than 45 degrees (0.79 rad).
3. Cleanouts and openings shall be equipped with tight-fitting doors constructed of steel having a thickness not less than that required for the duct.
4. Cleanout doors shall be installed liquid tight.
5. Door assemblies including any frames and gaskets shall be approved for the application and shall not have fasteners that penetrate the duct.
6. Gasket and sealing materials shall be rated for not less than 1500ºF (816ºC).
7. Listed door assemblies shall be installed in accordance with the manufacturer's instructions.

506.3.8.1 Personnel entry. Where ductwork is large enough to allow entry of personnel, not less than one *approved* or *listed* opening having dimensions not less than 22 inches by 20 inches (559 mm by 508 mm) shall be provided in the horizontal sections, and in the top of vertical risers. Where such entry is provided, the duct and its supports shall be capable of supporting the additional load, and the cleanouts specified in Section 506.3.8 are not required.

506.3.8.2 Cleanouts serving in-line fans. A cleanout shall be provided for both the inlet side and outlet side of an in-line fan except where a duct does not connect to the fan. Such cleanouts shall be located within 3 feet (914 mm) of the fan duct connections.

[S] 506.3.9 Grease duct cleanout location, spacing and installation.

[S] 506.3.9.1 Grease duct horizontal cleanouts. Cleanouts serving horizontal sections of grease ducts shall:

1. Be spaced not more than 20 feet (6096 mm) apart.
2. Be located not more than 10 feet (3048 mm) from changes in direction that are greater than 45 degrees (0.79 rad).

3. Be located on the bottom only where other locations are not available and shall be provided with internal damming of the opening such that grease will flow past the opening without pooling. Bottom cleanouts and openings shall be approved for the application and installed liquid-tight.
4. Not be closer than 1 inch (25 mm) from the edges of the duct.
5. Have opening dimensions of not less than 12 inches by 12 inches (305 mm by 305 mm). Where such dimensions preclude installation, the openings shall be not less than 12 inches (305 mm) on one side and shall be large enough to provide access for cleaning and maintenance.
6. Shall be located at grease reservoirs.

[S] 506.3.9.2 Grease duct vertical cleanouts. Where ducts pass vertically through floors, cleanouts shall be provided. A minimum of one cleanout shall be provided on each floor. Cleanout openings shall be not less than 1-1/2 inches (38 mm) from all outside edges of the duct or welded seams. The opening minimum dimensions shall be 12 inches (305 mm) on each side.

506.3.10 Underground grease duct installation. Underground grease duct installations shall comply with all of the following:

1. Underground grease ducts shall be constructed of steel having a minimum thickness of 0.0575 inch (1.463 mm) (No. 16 gage) and shall be coated to provide protection from corrosion or shall be constructed of stainless steel having a minimum thickness of 0.0450 inch (1.140 mm) (No. 18 gage).
2. The underground duct system shall be tested and approved in accordance with Section 506.3.2.5 prior to coating or placement in the ground.
3. The underground duct system shall be completely encased in concrete with a minimum thickness of 4 inches (102 mm).
4. Ducts shall slope toward grease reservoirs.
5. A grease reservoir with a cleanout to allow cleaning of the reservoir shall be provided at the base of each vertical duct riser.
6. Cleanouts shall be provided with access to permit cleaning and inspection of the duct in accordance with Section 506.3.
7. Cleanouts in horizontal ducts shall be installed on the topside of the duct.
8. Cleanout locations shall be legibly identified at the point of access from the interior space.

[S] 506.3.11 Grease duct enclosures. A commercial kitchen grease duct serving a Type I hood that penetrates a ceiling, wall, floor or any concealed spaces shall be enclosed from the point of penetration to the outlet terminal. In-line exhaust fans not located outdoors shall be enclosed as required for grease ducts. A duct shall penetrate exterior walls only at locations where unprotected openings are permitted by the *International Building Code*. The duct enclosure shall serve a single grease duct and shall not contain other ducts, piping or wiring systems. Duct enclosures shall be a shaft enclosure in accordance with Section 506.3.11.1, a field-applied enclosure assembly in accordance with Section 506.3.11.2 or a factory-built enclosure assembly in accordance with Section 506.3.11.3. Duct enclosures shall have a fire-resistance rating of not less than that of the assembly penetrated. ((~~and not less than 1 hour.~~)) The duct enclosure need not exceed 2 hours but shall not be less than 1 hour. Fire dampers and smoke dampers shall not be installed in grease ducts.

Exceptions:

1. A duct enclosure shall not be required for a grease duct that penetrates only a nonfire-resistance-rated roof/ceiling assembly.
2. In buildings that are designed in accordance with *International Building Code* Section 510.2, grease duct enclosures that penetrate the 3-hour horizontal assembly are permitted to be protected in accordance with the exception to Section 510.2 Item 3.

506.3.11.1 Shaft enclosure. Grease ducts constructed in accordance with Section 506.3.1 shall be permitted to be enclosed in accordance with the *International Building Code* requirements for shaft construction. Such grease duct systems and exhaust *equipment* shall have a *clearance* to combustible construction of not less than 18 inches (457 mm), and shall have a *clearance* to noncombustible construction and gypsum wallboard attached to noncombustible structures of not less than 6 inches (152 mm). Duct enclosures shall be sealed around the duct at the point of penetration and vented to the outside of the building through the use of weather-protected openings.

Interpretation: Gypsum wallboard installed on a combustible substrate or on wood studs does not cause the wall to be considered as a noncombustible assembly, and the 18 inch minimum *clearance* still applies. The classification of combustible and noncombustible materials is not changed by the use of fire-retardant-treated wood products or fire rated (Type "X") gypsum wallboard.

506.3.11.2 Field-applied grease duct enclosure. Grease ducts constructed in accordance with Section 506.3.1 shall be enclosed by a *listed* and *labeled* field-applied grease duct enclosure material, systems, product, or method of construction

specifically evaluated for such purpose in accordance with ASTM E2336. The surface of the duct shall be continuously covered on all sides from the point at which the duct originates to the outlet terminal. Duct penetrations shall be protected with a through-penetration firestop system tested and *listed* in accordance with ASTM E814 or UL 1479 and having an "F" and "T" rating equal to the fire-resistance rating of the assembly being penetrated. The grease duct enclosure and firestop system shall be installed in accordance with the listing and the manufacturer's instructions. Partial application of a field-applied grease duct enclosure shall not be installed for the sole purpose of reducing clearances to combustibles at isolated sections of grease duct. Exposed duct-wrap systems shall be protected where subject to physical damage.

506.3.11.3 Factory-built grease duct enclosure assemblies. Factory-built grease ducts incorporating integral enclosure materials shall be *listed* and *labeled* for use as grease duct enclosure assemblies specifically evaluated for such purpose in accordance with UL 2221. Duct penetrations shall be protected with a through-penetration firestop system tested and *listed* in accordance with ASTM E814 or UL 1479 and having an "F" and "T" rating equal to the fire-resistance rating of the assembly being penetrated. The grease duct enclosure assembly and firestop system shall be installed in accordance with the listing and the manufacturer's instructions.

506.3.12 Grease duct fire-resistive access opening. Where cleanout openings are located in ducts within a fire-resistance-rated enclosure, access openings shall be provided in the enclosure at each cleanout point. Access openings shall be equipped with tight-fitting sliding or hinged doors that are equal in fire-resistive protection to that of the shaft or enclosure. An *approved* sign shall be placed on access opening panels with wording as follows: "ACCESS PANEL. DO NOT OBSTRUCT."

506.3.13 Exhaust outlets serving Type I hoods. Exhaust outlets for grease ducts serving Type I hoods shall conform to the requirements of Sections 506.3.13.1 through 506.3.13.3.

506.3.13.1 Termination above the roof. Exhaust outlets that terminate above the roof shall have the discharge opening located not less than 40 inches (1016 mm) above the roof surface.

[S] 506.3.13.2 Termination through an exterior wall. Exhaust outlets shall be permitted to terminate through exterior walls where the smoke, grease, gases, vapors and odors in the discharge from such terminations do not create a public nuisance or a fire hazard. The installation of a pollution control unit in conjunction with an exhaust outlet shall be an approved method of eliminating smoke, grease, vapors and odors from discharging to the exterior. Such terminations shall not be located where protected openings are required by the *International Building Code*.

Such terminations shall be located in accordance with Section 506.3.13.3 and shall not be located within ((~~3 feet (914 mm)~~)) 10 feet (3.048 m) of any opening in the exterior wall except non-openable windows glazed with tempered or wired glass. The discharge outlets shall be not less than 10 feet (3.048 m) above the sidewalk or other walks, drives, streets or alleys. No portion of an exhaust outlet shall protrude into a public place less than 16 feet (4.876 m) above the ground. Whenever any portion of the exhaust outlet or duct protrudes beyond the property line over a public place, it is subject to the permit requirements of the Seattle Department of Transportation.

Note: See Director's Rule for the conditions where Type I hoods that are part of small commercial kitchen exhaust systems in taller buildings may be permitted to terminate at an exterior wall.

506.3.13.3 Termination location. Exhaust outlets shall be located not less than 10 feet (3048 mm) horizontally from parts of the same or contiguous buildings, adjacent buildings and adjacent property lines and shall be located not less than 10 feet (3048 mm) above the adjoining grade level. Exhaust outlets shall be located not less than 10 feet (3048 mm) horizontally from or not less than 3 feet (914 mm) above air intake openings into any building.

Exception: Exhaust outlets shall terminate not less than 5 feet (1524 mm) horizontally from parts of the same or contiguous building, an adjacent building, adjacent property line and air intake openings into a building where air from the exhaust outlet discharges away from such locations.

[S] 506.4 Ducts serving Type II hoods. Commercial kitchen exhaust systems serving Type II hoods shall comply with Sections 506.4.1 and 506.4.2.

Interpretation: For purposes of this section, property line includes any property line separating one lot from another lot, but does not include any property line separating a lot from a public street or alley right-of-way.

[S] 506.4.1 Ducts. Ducts and plenums serving Type II hoods shall be constructed of rigid metallic materials. Duct construction, installation, bracing and supports shall comply with Chapter 6. A duct serving a Type II hood that penetrates a fire-resistance-rated ceiling, floor or wall shall be in a rated enclosure from the point of penetration to the outlet with a rating equal to the fire-resistance rating of the assembly being penetrated. Ducts subject to positive pressure and ducts conveying moisture-laden or waste-heat-laden air shall be constructed, joined and sealed in an *approved* manner.

[S] 506.4.2 Type II terminations. Exhaust outlets serving Type II hoods shall terminate in accordance with the hood manufacturer's installation instructions and shall comply with all of the following:

15. Pollution-control units shall be maintained in accordance with the manufacturer's instructions.

506.5.3 Exhaust fan discharge. Exhaust fans shall be positioned so that the discharge will not impinge on the roof, other *equipment* or appliances or parts of the structure. A vertical discharge fan shall be manufactured with an *approved* drain outlet at the lowest point of the housing to permit drainage of grease to an *approved* grease reservoir.

506.5.4 Exhaust fan mounting. Up-blast fans serving Type I hoods and installed in a vertical or horizontal position shall be hinged, supplied with a flexible weatherproof electrical cable to permit inspection and cleaning and shall be equipped with a means of restraint to limit the swing of the fan on its hinge. The ductwork shall extend not less than 18 inches (457 mm) above the roof surface.

506.5.5 Clearances. Exhaust *equipment* serving a Type I hood shall have a *clearance* to combustible construction of not less than 18 inches (457 mm).

Exception: Factory-built exhaust *equipment* installed in accordance with Section 304.1 and *listed* for a lesser *clearance*.

506.5.6 Termination location. The outlet of exhaust *equipment* serving Type I hoods shall be in accordance with Section 506.3.13.

Exception: The minimum horizontal distance between vertical discharge fans and parapet-type building structures shall be 2 feet (610 mm) provided that such structures are not higher than the top of the fan discharge opening.

SECTION 507
COMMERCIAL KITCHEN HOODS

[S] 507.1 General. Commercial kitchen exhaust hoods shall comply with the requirements of this section. Hoods shall be Type I or II and shall be designed to capture and confine cooking vapors and residues. A Type I or Type II hood shall be installed at or above *appliances* in accordance with Sections 507.2 and 507.3 and Table 507.2.1. Where any cooking *appliance* under a single hood requires a Type I hood, a Type I hood shall be installed. Where a Type II hood is required, a Type I or Type II hood shall be installed. Where a Type I hood is installed, the installation of the entire system, including the hood, ducts, exhaust equipment and makeup air system shall comply with the requirements of Sections 506, 507, 508 and 509.

Exceptions:

1. Factory-built commercial exhaust hoods that are listed and labeled in accordance with UL 710, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5.
2. Factory-built commercial cooking recirculating systems that are listed and labeled in accordance with UL 710B, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5. Spaces in which such systems are located shall be considered to be kitchens and shall be ventilated in accordance with Table 403.3.1.1. The kitchen exhaust system shall discharge in accordance with Section 501.3.1, item 3. For the purpose of determining the floor area required to be ventilated, each individual *appliance* shall be considered as occupying not less than 100 square feet (9.3 m^2).
3. Where cooking appliances are equipped with integral down-draft exhaust systems and such appliances and exhaust systems are listed and labeled for the application in accordance with NFPA 96, a hood shall not be required at or above them.

507.1.1 Operation. Commercial kitchen exhaust hood systems shall operate during the cooking operation. The hood exhaust rate shall comply with the listing of the hood or shall comply with Section 507.5. The exhaust fan serving a Type I hood shall have automatic controls that will activate the fan when any appliance that requires such Type I Hood is turned on, or a means of interlock shall be provided that will prevent operation of such appliances when the exhaust fan is not turned on. Where one or more temperature or radiant energy sensors are used to activate a Type I hood exhaust fan, the fan shall activate not more than 15 minutes after the first appliance served by that hood has been turned on. A method of interlock between an exhaust hood system and appliances equipped with standing pilot burners shall not cause the pilot burners to be extinguished. A method of interlock between an exhaust hood system and cooking appliances shall not involve or depend on any component of a fire-extinguishing system.

The net exhaust volumes for hoods shall be permitted to be reduced during part-load cooking conditions, where engineered or *listed* multispeed or variable speed controls automatically operate the exhaust system to maintain capture and removal of cooking effluents as required by this section. Reduced volumes shall not be below that required to maintain capture and removal of effluents from the idle cooking appliances that are operating in a standby mode.

507.1.1.1 Multiple hoods utilizing a single exhaust system. Where heat or radiant energy sensors are utilized in hood systems consisting of multiple hoods served by a single exhaust system, such sensors shall be provided in each hood. Sensors shall be capable of being accessed from the hood outlet or from a cleanout location.

[S] 507.1.2 Domestic cooking appliances used for commercial purposes. Domestic cooking appliances utilized for commercial purposes shall be provided with Type I, ((~~or~~)) Type II or residential hoods ((~~as required for the type of appliances and~~

~~processes~~)) in accordance with Sections 507.2 and 507.3 and Table 507.1.2. Domestic cooking appliances utilized for domestic cooking shall comply with Section 505.

[S] TABLE 507.1.2
TYPE OF HOOD REQUIRED FOR DOMESTIC COOKING APPLIANCES[1,2]

TYPE OF SPACE[3]	TYPE OF COOKING	TYPE OF HOOD
Church	1) Boiling, steaming and warming precooked food	Type II
	2) Roasting, pan frying and deep frying	Type I
Community or party room in apartment and condominium	1) Boiling, steaming and warming precooked food	Residential hood[4] or Type II [5]
	2) Roasting, pan frying and deep frying	Type I
Day care	1) Boiling, steaming and warming precooked food	Residential hood[4] or Type II [5]
	2) Roasting, pan frying and deep frying	Type I
Dormitory, boarding home, nursing home	1) Boiling, steaming and warming precooked food	Type II
	2) Roasting, pan frying and deep frying	Type I
Office lunch room	1) Boiling, steaming and warming precooked food	Residential hood[4] or Type II [5]
	2) Roasting, pan frying and deep frying	Type I

[1] *Commercial cooking appliances* shall comply with Section 507.2.
[2] Requirements in this table apply to electric or gas fuel appliances only. Solid fuel appliances or charbroilers require Type I hoods.
[3] The *code official* shall determine hood requirements for other types of spaces.
[4] Residential hood shall vent to outside.
[5] A Type II hood is required when the combined capacity of cooking appliances is more than 6 kW.

507.1.3 Fuel-burning appliances. Where vented fuel-burning appliances are located in the same room or space as the hood, provisions shall be made to prevent the hood system from interfering with normal operation of the *appliance* vents.

507.1.4 Cleaning. A hood shall be designed to provide for thorough cleaning of the entire hood.

507.1.5 Exhaust outlets. Exhaust outlets located within the hood shall be located so as to optimize the capture of particulate matter. Each outlet shall serve not more than a 12-foot (3658 mm) section of hood.

[S] 507.2 Type I hoods. Type I hoods shall be installed where cooking *appliances* produce grease or smoke as a result of the cooking process. Type I hoods shall be installed over *medium-duty*, *heavy-duty* and *extra-heavy-duty cooking appliances*.

Exceptions:

1. A Type I hood shall not be required for an electric cooking appliance where an approved testing agency provides documentation that the appliance effluent contains 5 mg/m^3 or less of grease when tested at an exhaust flow rate of 500 cfm (0.236 m^3/s) in accordance with UL 710B.
2. A Type I hood shall not be required in an R-2 an *occupancy* with not more than 16 residents.

507.2.1 Type I exhaust flow rate label. Type I hoods shall bear a label indicating the minimum exhaust flow rate in cfm per linear foot (1.55 L/s per linear meter) of hood that provides for capture and containment of the exhaust effluent for the cooking appliances served by the hood, based on the cooking appliance duty classifications defined in this code.

[S] TABLE 507.2.1
TYPE OF HOOD REQUIRED FOR COMMERCIAL COOKING APPLIANCES

TYPE OF APPLIANCE[1]	TYPE OF HOOD REQUIRED[2]		
	TYPE I[3]	TYPE II	NONE [6]
Baking oven	Solid fuel	> 6 kW	≤ 6 kW
Charbroiler	All sizes		
Coffee maker		> 6 kW	≤ 6 kW
Coffee roaster[4]		All sizes	
Convection ovens (electric)		> 6 kW	≤ 6 kW
Deep-fat fryer	All sizes		
Dishwasher		> 140°F	≤ 140°F
Grill	All sizes		
Hot dog display heater		> 6 kW	≤ 6 kW
Microwave oven			All sizes
Pastry oven		> 6 kW	≤ 6 kW
Pizza oven	Solid fuel	> 6 kW	≤ 6 kW
Popcorn maker		> 6 kW	≤ 6 kW
Roasting oven[5]	> 6 kW	≤ 6 kW	
Roll warmer		> 6 kW	≤ 6 kW
Solid-fuel burning appliances	All sizes & all food products		
Soup warmer, soup preparation cooking unit		> 6 kW	≤ 6 kW
Steam reconstitution device		> 6 kW	≤ 6 kW
Steam table		> 6 kW	≤ 6 kW
Steamer		> 6 kW	≤ 6 kW
Toaster		> 6 kW	≤ 6 kW
Warming oven		> 6 kW	≤ 6 kW

1 The code official shall determine hood requirements for appliances not listed in the table.
2 Section 507.2 describes Type I and Type II kitchen hoods.
3 The definition of extra-heavy-duty cooking appliance includes all appliances utilizing solid fuel.
4 Puget Sound pollution control requires an after-burner for particulates.
5 Roasting ovens are used to cook raw or partially cooked food.
6 Where no hood is required, general kitchen exhaust shall be required per Section 507.3.

507.2.2 Type I extra-heavy-duty. Type I hoods for use over *extra-heavy-duty cooking appliances* shall not cover *heavy-*, *medium-* or *light-duty appliances*. Such hoods shall discharge to an exhaust system that is independent of other exhaust systems.

507.2.3 Type I materials. Type I hoods shall be constructed of steel having a minimum thickness of 0.0466 inch (1.181 mm) (No. 18 gage) or stainless steel not less than 0.0335 inch [0.8525 mm (No. 20 MSG)] in thickness.

507.2.4 Type I supports. Type I hoods shall be secured in place by noncombustible supports. Type I hood supports shall be adequate for the applied load of the hood, the unsupported ductwork, the effluent loading and the possible weight of personnel working in or on the hood.

507.2.5 Type I hoods. External hood joints, seams and penetrations for Type I hoods shall be made with a continuous external liquid-tight weld or braze to the lowest outermost perimeter of the hood. Internal hood joints, seams, penetrations, filter support frames and other appendages attached inside the hood shall not be required to be welded or brazed but shall be otherwise sealed to be grease tight.

Exceptions:

1. Penetrations shall not be required to be welded or brazed where sealed by devices that are *listed* for the application.
2. Internal welding or brazing of seams, joints and penetrations of the hood shall not be prohibited provided that the joint is formed smooth or ground so as to not trap grease, and is readily cleanable.

[S] 507.2.6 Clearances for Type I hood. A Type I hood shall be installed with a *clearance* to combustibles of not less than 18 inches (457 mm).

Exceptions:

1. *Clearance* shall not be required from gypsum wallboard or 1/2-inch (12.7 mm) or thicker cementitious wallboard attached to noncombustible structures provided that a smooth, cleanable, nonabsorbent and noncombustible material is installed between the hood and the gypsum or cementitious wallboard over an area extending not less than 18 inches (457 mm) in all directions from the hood.

Interpretation: Gypsum wallboard installed on a combustible substrate or on wood studs does not cause the wall to be considered a noncombustible assembly, and the 18 inch minimum *clearance* still applies. The classification of combustible and noncombustible materials is not changed by the use of fire-retardant-treated wood products or fire rated (Type "X") gypsum wallboard.

2. Type I hoods listed and labeled for clearances less than 18 inches in accordance with UL 710 shall be installed with the clearances specified by such listings.

[S] 507.2.7 Type I hoods penetrating a ceiling. Type I hoods or portions thereof penetrating a ceiling, wall or furred space shall comply with Section 506.3.11. Field-applied grease duct enclosure systems, as addressed in Section 506.3.11.2, shall not be utilized to satisfy the requirements of this section.

Exception: The exhaust hood may penetrate the plane of the adjacent ceiling without a rated enclosure when the ceiling is a minimum of 18" from the hood and the area above the ceiling is separated from a plenum.

507.2.8 Type I grease filters. Type I hoods shall be equipped with grease filters listed and labeled in accordance with UL 1046. Grease filters shall be provided with access for cleaning or replacement. The lowest edge of a grease filter located above the cooking surface shall be not less than the height specified in Table 507.2.8.

TABLE 507.2.8
MINIMUM DISTANCE BETWEEN THE LOWEST EDGE OF A GREASE FILTER AND THE COOKING SURFACE OR THE HEATING SURFACE

TYPE OF COOKING APPLIANCES	HEIGHT ABOVE COOKING SURFACE (feet)
Without exposed flame	0.5
Exposed flame and burners	2
Exposed charcoal and charbroil type	3.5

For SI: 1 foot = 304.8 mm.

507.2.8.1 Criteria. Filters shall be of such size, type and arrangement as will permit the required quantity of air to pass through such units at rates not exceeding those for which the filter or unit was designed or *approved*. Filter units shall be installed in frames or holders so as to be readily removable without the use of separate tools, unless designed and installed to be cleaned in place and the system is equipped for such cleaning in place. Where filters are designed and required to be cleaned, removable filter units shall be of a size that will allow them to be cleaned in a dishwashing machine or pot sink. Filter units shall be arranged in place or provided with drip-intercepting devices to prevent grease or other condensate from dripping into food or on food preparation surfaces.

507.2.8.2 Mounting position of grease filters. Filters shall be installed at an angle of not less than 45 degrees (0.79 rad) from the horizontal and shall be equipped with a drip tray beneath the lower edge of the filters.

507.2.9 Grease gutters for Type I hood. Grease gutters shall drain to an *approved* collection receptacle that is fabricated, designed and installed to allow access for cleaning.

[S] 507.3 Type II hoods. Type II hoods shall be installed ((~~above~~)) for collecting and removing steam, vapor, heat or odors from dishwashers and appliances that produce heat or moisture and do not produce grease or smoke as a result of the cooking process, except where the heat and moisture loads from such appliances are incorporated into the HVAC system design or into the design of a separate removal system. Type II hoods shall be installed ((~~above~~)) for collecting and removing steam, vapor, heat or odors from all appliances that produce products of combustion and do not produce grease or smoke as a result of the cooking process. Spaces containing cooking appliances that do not require Type II hoods shall be provided with exhaust at a rate of 0.70 cfm per square foot (0.00033 m^3/s). For the purpose of determining the floor area required to be exhausted, each individual appliance that is not required to be installed under a Type II hood shall be considered as occupying not less than 100 square feet (9.3 m^2). Such additional square footage shall be provided with exhaust at a rate of 0.70 cfm per square foot [.00356 $m^3/(s \cdot m^2)$].

507.3.1 Type II hood materials. Type II hoods shall be constructed of steel having a minimum thickness of 0.0296 inch (0.7534 mm) (No. 22 gage) or stainless steel not less than 0.0220 inch (0.5550 mm) (No. 24 gage) in thickness, copper sheets weighing not less than 24 ounces per square foot (7.3 kg/m^2) or of other *approved* material and gage.

507.3.2 Type II supports. Type II hood supports shall be adequate for the applied load of the hood, the unsupported ductwork, the effluent loading and the possible weight of personnel working in or on the hood.

507.3.3 Type II hoods joint, seams and penetrations. Joints, seams and penetrations for Type II hoods shall be constructed as set forth in Chapter 6, shall be sealed on the interior of the hood and shall provide a smooth surface that is readily cleanable and water tight.

507.4 Hood size and location. Hoods shall comply with the overhang, setback and height requirements in accordance with Sections 507.4.1 and 507.4.2, based on the type of hood.

507.4.1 Canopy size and location. The inside lower edge of canopy-type Type I and II commercial hoods shall overhang or extend a horizontal distance of not less than 6 inches (152 mm) beyond the edge of the top horizontal surface of the *appliance* on all open sides. The vertical distance between the front lower lip of the hood and such surface shall not exceed 4 feet (1219 mm).

Exception: The hood shall be permitted to be flush with the outer edge of the cooking surface where the hood is closed to the *appliance* side by a noncombustible wall or panel.

507.4.2 Noncanopy size and location. Noncanopy-type hoods shall be located not greater than 3 feet (914 mm) above the cooking surface. The edge of the hood shall be set back not greater than 1 foot (305 mm) from the edge of the cooking surface.

507.5 Capacity of hoods. Commercial food service hoods shall exhaust a minimum net quantity of air determined in accordance with this section and Sections 507.5.1 through 507.5.5. The net quantity of *exhaust air* shall be calculated by subtracting any airflow supplied directly to a hood cavity from the total exhaust flow rate of a hood. Where any combination of *heavy-duty*, *medium-duty* and *light-duty cooking appliances* are utilized under a single hood, the exhaust rate required by this section for the heaviest duty *appliance* covered by the hood shall be used for the entire hood.

[S] 507.5.1 Extra-heavy-duty (solid fuel) cooking appliances. The minimum net airflow for hoods, as determined by Section 507.1, used for *extra-heavy-duty cooking appliances* shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Backshelf/pass-over	Not allowed
Double island canopy (per side)	550
Eyebrow	Not allowed
Single island canopy	700
Wall-mounted canopy	550

For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.

507.5.2 Heavy-duty cooking appliances. The minimum net airflow for hoods, as determined by Section 507.1, used for *heavy-duty cooking appliances* shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Backshelf/pass-over	400
Double island canopy (per side)	400
Eyebrow	Not allowed
Single island canopy	600
Wall-mounted canopy	400

For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.

507.5.3 Medium-duty cooking appliances. The minimum net airflow for hoods, as determined by Section 507.1, used for *medium-duty cooking appliances* shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Backshelf/pass-over	300
Double island canopy (per side)	300
Eyebrow	250
Single island canopy	500
Wall-mounted canopy	300

For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.

507.5.4 Light-duty cooking appliances. The minimum net airflow for hoods, as determined by Section 507.1, used for *light-duty* cooking appliances and food service preparation shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Backshelf/pass-over	250
Double island canopy (per side)	250
Eyebrow	250
Single island canopy	400
Wall-mounted canopy	200

For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.

507.5.5 Dishwashing appliances. The minimum net airflow for Type II hoods used for dishwashing appliances shall be 100 cfm per linear foot (155 L/s per linear meter) of hood length.

Exception: Dishwashing appliances and *equipment* installed in accordance with Section 507.3.

507.6 Performance test. A performance test shall be conducted upon completion and before final approval of the installation of a ventilation system serving *commercial cooking appliances*. The test shall verify the rate of exhaust airflow required by Section 507.5, makeup airflow required by Section 508 and proper operation as specified in this chapter. The permit holder shall furnish the necessary test *equipment* and devices required to perform the tests.

507.6.1 Capture and containment test. The permit holder shall verify capture and containment performance of the exhaust system. This field test shall be conducted with all appliances under the hood at operating temperatures, with all sources of outdoor air providing *makeup air* for the hood operating and with all sources of recirculated air providing conditioning for the space in which the hood is located operating. Capture and containment shall be verified visually by observing smoke or steam produced by actual or simulated cooking, such as that provided by smoke candles and smoke puffers. Smoke bombs shall not be used.

SECTION 508
COMMERCIAL KITCHEN MAKEUP AIR

[S] 508.1 Makeup air. *Makeup air* shall be supplied during the operation of commercial kitchen exhaust systems that are provided for *commercial cooking appliances*. ((~~The amount of *makeup air* supplied to the building from all sources shall be approximately equal to the amount of *exhaust air* for all exhaust systems for the building.~~)) A separate *makeup air* system for the kitchen shall be capable of providing not less than 90 percent of the air to be exhausted. The *makeup air* shall not reduce the effectiveness of the exhaust system. *Makeup air* shall be provided by gravity or mechanical means or both. Mechanical *makeup air* systems shall be automatically controlled to start and operate simultaneously with the exhaust system. Exterior windows and doors shall not be used to provide commercial kitchen *makeup air*. *Makeup air* intake opening locations shall comply with Section 401.4.

Note: Refer to Section C403.7.7 of the *Seattle Energy Code* in addition to the requirements of this section.

Exceptions:

1. Where the total airflow for the exhaust system is less than 400 cfm, *makeup air* is not required; or
2. In atriums, food courts, and similar areas, occupant *ventilation air* that would otherwise exfiltrate or be exhausted by other mechanical exhaust systems may be used to provide all *makeup air*, or a portion of *makeup air* when a direct path through permanent openings exists for occupant *ventilation air* to transfer to the kitchen hood area. That portion of air not supplied by occupant *ventilation air* shall be provided by a separate *makeup air* system. The combined air quantity provided by a separate *makeup air* system and occupant *ventilation air* shall provide 100 percent of the air to be exhausted.

[S] 508.1.1 Makeup air temperature. The temperature differential between *makeup air* and the air in the conditioned space shall not exceed 10ºF (6ºC) if the amount of *makeup air* supply exceeds 2,500 cfm (1180 L/s) per space except where the added heating and cooling loads of the *makeup air* do not exceed the capacity of the HVAC system.

508.1.2 Air balance. Design plans for a facility with a commercial kitchen ventilation system shall include a schedule or diagram indicating the design outdoor air balance. The design outdoor air balance shall indicate all exhaust and replacement air for the facility, plus the net exfiltration if applicable. The total replacement air airflow rate shall equal the total exhaust airflow rate plus the net exfiltration.

508.2 Compensating hoods. Manufacturers of compensating hoods shall provide a label indicating the minimum exhaust flow, the maximum makeup airflow or both that provides capture and containment of the exhaust effluent.

Exception: Compensating hoods with *makeup air* supplied only from the front face discharge and side face discharge openings shall not be required to be labeled with the maximum makeup airflow.

SECTION 509
FIRE SUPPRESSION SYSTEMS

509.1 Where required. *Cooking appliances* required by Section 507.2 to have a Type I hood shall be provided with an *approved* automatic fire suppression system complying with the *International Building Code* and the *International Fire Code*.

SECTION 510
HAZARDOUS EXHAUST SYSTEMS

510.1 General. This section shall govern the design and construction of duct systems for hazardous exhaust and shall determine where such systems are required. Hazardous exhaust systems are systems designed to capture and control hazardous emissions generated from product handling or processes, and convey those emissions to the outdoors. Hazardous emissions include flammable vapors, gases, fumes, mists or dusts, and volatile or airborne materials posing a health hazard, such as toxic or corrosive materials. For the purposes of this section, the health-hazard rating of materials shall be as specified in NFPA 704.

For the purposes of the provisions of Section 510, a laboratory shall be defined as a facility where the use of chemicals is related to testing, analysis, teaching, research or developmental activities. Chemicals are used or synthesized on a nonproduction basis, rather than in a manufacturing process.

[S] 510.2 Where required. A hazardous exhaust system shall be required wherever operations involving the handling or processing of hazardous materials, in the absence of such exhaust systems and under normal operating conditions, have the potential to create one of the following conditions:

1. A flammable vapor, gas, fume, mist or dust is present in concentrations exceeding 25 percent of the lower flammability limit of the substance for the expected room temperature.
2. A vapor, gas, fume, mist or dust with a health-hazard rating of 4 is present in any concentration.
3. A vapor, gas, fume, mist or dust with a health-hazard rating of 1, 2 or 3 is present in concentrations exceeding 1 percent of the median lethal concentration of the substance for acute inhalation toxicity.

((~~**Exception:** Laboratories, as defined in Section 510.1, except where the concentrations listed in Item 1 are exceeded or a vapor, gas, fume, mist or dust with a health-hazard rating of 1, 2, 3 or 4 is present in concentrations exceeding 1 percent of the median lethal concentration of the substance for acute inhalation toxicity.~~))

In lieu of complying with this section, research and educational laboratories are permitted to comply with rules adopted by the Director for laboratory exhaust systems for hazardous materials.

Note: See Director's Rule 30-2005 for provisions on ventilation systems in research and educational laboratories.

[F] 510.2.1 Lumber yards and woodworking facilities. *Equipment* or machinery located inside buildings at lumber yards and woodworking facilities that generates or emits combustible dust shall be provided with an *approved* dust-collection and exhaust system installed in accordance with this section and the *International Fire Code*. *Equipment* and systems that are used to collect, process or convey combustible dusts shall be provided with an *approved* explosion-control system.

[F] 510.2.2 Combustible fibers. *Equipment* or machinery within a building that generates or emits combustible fibers shall be provided with an *approved* dust-collecting and exhaust system. Such systems shall comply with this code and the *International Fire Code*.

[S] 510.2.3 Model shops and other intermittent use facilities. *Equipment* or machinery located inside buildings that emit dust but are used on an intermittent basis, such as in model shops, research and development facilities, hobby, and other nonproduction uses, shall be provided with a local, point of use dust collection system. The dust collector is permitted to be a portable type with high efficiency filters to allow *exhaust air* to be discharged back into the space. Such collectors are not required to be provided with an *approved* explosion-control system. Such systems shall be limited to an aggregate airflow of no more than 1,500 cfm per room.

510.3 Design and operation. The design and operation of the exhaust system shall be such that flammable contaminants are diluted in noncontaminated air to maintain concentrations in the exhaust flow below 25 percent of the contaminant's lower flammability limit.

510.4 Independent system. Hazardous exhaust systems shall be independent of other types of exhaust systems.

510.5 Incompatible materials and common shafts. Incompatible materials, as defined in the *International Fire Code*, shall not be exhausted through the same hazardous exhaust system. Hazardous exhaust systems shall not share common shafts with other duct systems, except where such systems are hazardous exhaust systems originating in the same fire area.

Exception: The provisions of this section shall not apply to laboratory exhaust systems where all of the following conditions apply:

510.8 Suppression required.

[S] 510.8.1 Ducts. Ducts shall be protected with an *approved* automatic fire suppression system installed in accordance with the *International Building Code*.

Exceptions:

1. An approved automatic fire suppression system shall not be required in ducts conveying materials, fumes, mists and vapors that are nonflammable and noncombustible under all conditions and at any concentrations.
2. Automatic fire suppression systems shall not be required in metallic and noncombustible, nonmetallic exhaust ducts in semiconductor fabrication facilities.
3. An *approved* automatic fire suppression system shall not be required in ducts where the largest cross-sectional diameter of the duct is less than 10 inches (254 mm).
4. For laboratories, as defined in Section 510.1, automatic fire protection systems shall not be required ((~~in~~)) for metallic ducts that serve laboratory hoods or exhaust systems.
5. An *approved* automatic fire suppression system is not required in metallic ducts serving fume hoods if all fume hoods served by the duct are equipped with an *approved* fire suppression system.

((~~510.8.1~~)) 510.8.2 Duct cleanout. Ducts conveying combustible dust as part of a dust collection system shall be equipped with cleanouts that are provided with approved access, pre-designed to be disassembled for cleaning, or engineered for automatic cleanouts. Where provided, cleanouts shall be located at the base of each vertical duct riser and at intervals not exceeding 20 feet (6096 mm) in horizontal sections of duct.

[S] 510.8.3 Fume hoods. *Approved* automatic fire suppression shall be installed in fume hoods within which operations are conducted involving hazardous materials that have the potential to create a flammable vapor, gas, fume, mist, or dust in concentrations exceeding 25 percent of the lower flammability limit of the substance or mixture for the expected room temperature in the absence of the fume hood and under normal operating conditions.

510.9 Duct construction. Ducts used to convey hazardous exhaust shall be constructed of materials *approved* for installation in such an exhaust system and shall comply with one of the following:

1. Ducts shall be constructed of *approved* G90 galvanized sheet steel, with a minimum nominal thickness as specified in Table 510.9.
2. Ducts used in systems exhausting nonflammable corrosive fumes or vapors shall be constructed of nonmetallic materials that exhibit a flame spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E84 or UL 723 and that are *listed* and *labeled* for the application.

Where the products being exhausted are detrimental to the duct material, the ducts shall be constructed of alternative materials that are compatible with the exhaust.

TABLE 510.9
MINIMUM DUCT THICKNESS

DIAMETER OF DUCT OR MAXIMUM SIDE DIMENSION	MINIMUM NOMINAL THICKNESS		
	Nonabrasive materials	Nonabrasive/abrasive materials	Abrasive materials
0–8 inches	0.028 inch (No. 24 gage)	0.034 inch (No. 22 gage)	0.040 inch (No. 20 gage)
9–18 inches	0.034 inch (No. 22 gage)	0.040 inch (No. 20 gage)	0.052 inch (No. 18 gage)
19–30 inches	0.040 inch (No. 20 gage)	0.052 inch (No. 18 gage)	0.064 inch (No. 16 gage)
Over 30 inches	0.052 inch (No. 18 gage)	0.064 inch (No. 16 gage)	0.079 inch (No. 14 gage)

For SI: 1 inch = 25.4 mm.

510.9.1 Duct joints. Ducts shall be made tight with lap joints having a minimum lap of 1 inch (25 mm). Joints used in ANSI/SMACNA Round Industrial Duct Construction Standards and ANSI/SMACNA Rectangular Industrial Duct Construction Standards are also acceptable.

510.9.2 Clearance to combustibles. Ducts shall have a *clearance* to combustibles in accordance with Table 510.9.2. Exhaust gases having temperatures in excess of 600ºF (316ºC) shall be exhausted to a *chimney* in accordance with Section 511.2.

TABLE 510.9.2
CLEARANCE TO COMBUSTIBLES

TYPE OF EXHAUST OR TEMPERATURE OF EXHAUST (ºF)	CLEARANCE TO COMBUSTIBLES (inches)
Less than 100	1
100–600	12
Flammable vapors	6

For SI: 1 inch = 25.4 mm, ºC = [(ºF) - 32]/1.8.

510.9.3 Explosion relief. Systems exhausting potentially explosive mixtures shall be protected with an *approved* explosion relief system or by an *approved* explosion prevention system designed and installed in accordance with NFPA 69. An explosion relief system shall be designed to minimize the structural and mechanical damage resulting from an explosion or deflagration within the exhaust system. An explosion prevention system shall be designed to prevent an explosion or deflagration from occurring.

510.10 Supports. Ducts shall be supported at intervals not exceeding 10 feet (3048 mm). Supports shall be constructed of noncombustible material.

SECTION 511
DUST, STOCK AND REFUSE CONVEYING SYSTEMS

511.1 Dust, stock and refuse conveying systems. Dust, stock and refuse conveying systems shall comply with the provisions of Section 510 and Sections 511.1.1 through 511.2.

[S] 511.1.1 Collectors and separators. Collectors and separators involving such systems as centrifugal separators, bag filter systems and similar devices, and associated supports shall be constructed of noncombustible materials and shall be located on the exterior of the building or structure. A collector or separator shall not be located nearer than 10 feet (3048 mm) to combustible construction or to an unprotected wall or floor opening, unless the collector is provided with a metal vent pipe that extends above the highest part of any roof with a distance of 30 feet (9144 mm).

Exceptions:

1. Collectors such as “Point of Use” collectors, close extraction weld fume collectors, spray finishing booths, stationary grinding tables, sanding booths, and integrated or machine-mounted collectors shall be permitted to be installed indoors provided that the installation is in accordance with the *International Fire Code* and NFPA 70.
2. Collectors in independent exhaust systems handling combustible dusts shall be permitted to be installed indoors provided that such collectors are installed in compliance with the *International Fire Code* and ((~~NFPA 70~~)) the *Seattle Electrical Code*.

511.1.2 Discharge pipe. Discharge piping shall conform to the requirements for ducts, including clearances required for high-heat appliances, as contained in this code. A delivery pipe from a cyclone collector shall not convey refuse directly into the firebox of a boiler, furnace, Dutch oven, refuse burner, incinerator or other *appliance*.

511.1.3 Conveying systems exhaust discharge. An exhaust system shall discharge to the outside of the building either directly by flue or indirectly through the bin or vault into which the system discharges except where the contaminants have been removed. Exhaust system discharge shall be permitted to be recirculated provided that the solid particulate has been removed at a minimum efficiency of 99.9 percent at 10 microns (10.01 mm), vapor concentrations are less than 25 percent of the LFL, and *approved equipment* is used to monitor the vapor concentration.

511.1.4 Spark protection. The outlet of an open-air exhaust terminal shall be protected with an *approved* metal or other noncombustible screen to prevent the entry of sparks.

511.1.5 Explosion relief vents. A safety or explosion relief vent shall be provided on all systems that convey combustible refuse or stock of an explosive nature, in accordance with the requirements of the *International Building Code*.

511.1.5.1 Screens. Where a screen is installed in a safety relief vent, the screen shall be attached so as to permit ready release under the explosion pressure.

511.1.5.2 Hoods. The relief vent shall be provided with an *approved* noncombustible cowl or hood, or with a counterbalanced relief valve or cover arranged to prevent the escape of hazardous materials, gases or liquids.

511.2 Exhaust outlets. Outlets for exhaust that exceed 600ºF (315ºC) shall be designed as a *chimney* in accordance with Table 511.2.

TABLE 511.2
CONSTRUCTION, CLEARANCE AND TERMINATION REQUIREMENTS FOR SINGLE-WALL METAL CHIMNEYS

CHIMNEYS SERVING	MINIMUM THICKNESS		TERMINATION				CLEARANCE			
	Walls (inch)	Lining	Above roof opening (feet)	Above any part of building within (feet)			Combustible construction (inches)		Noncombustible construction	
				10	25	50	Interior inst.	Exterior inst.	Interior inst.	Exterior inst.
High-heat appliances (Over 2,000ºF)[a]	0.127 (No. 10 MSG)	4-1/2" laid on 4-1/2" bed	20	—	—	20	See Note c			
Low-heat appliances (1,000ºF normal operation)	0.127 (No. 10 MSG)	none	3	2	—	—	18	6	Up to 18" diameter, 2" Over 18" diameter, 4"	
Medium-heat appliances (2,000ºF maximum)[b]	0.127 (No. 10 MSG)	Up to 18" dia.—2-1/2" Over 18"—4-1/2" On 4-1/2" bed	10	—	10	—	36	24		

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, ºC = [(ºF) - 32]/1.8.

a. Lining shall extend from bottom to top of outlet.

b. Lining shall extend from 24 inches below connector to 24 feet above.

c. Clearance shall be as specified by the design engineer and shall have sufficient clearance from buildings and structures to avoid overheating combustible materials (maximum 160ºF).

SECTION 512
SUBSLAB SOIL EXHAUST SYSTEMS

512.1 General. Where a subslab soil exhaust system is provided, the duct shall conform to the requirements of this section.

[S] 512.2 Materials. Subslab soil exhaust system duct material shall be air duct material *listed* and *labeled* to the requirements of UL 181 for Class 0 air ducts, or any of the following piping materials that comply with the ((~~*International*~~)) *Uniform Plumbing Code* as building sanitary drainage and vent pipe: cast iron; galvanized steel; copper or copper-alloy pipe and tube of a weight not less than type DWV; and plastic piping.

512.3 Grade. Exhaust system ducts shall not be trapped and shall have a minimum slope of one-eighth unit vertical in 12 units horizontal (1-percent slope).

512.4 Termination. Subslab soil exhaust system ducts shall extend through the roof and terminate not less than 6 inches (152 mm) above the roof and not less than 10 feet (3048 mm) from any operable openings or air intake.

512.5 Identification. Subslab soil exhaust ducts shall be permanently identified within each floor level by means of a tag, stencil or other *approved* marking.

SECTION 513
SMOKE CONTROL SYSTEMS

[F] 513.1 Scope and purpose. This section applies to mechanical and passive smoke control systems that are required by the *International Building Code* or the *International Fire Code*. The purpose of this section is to establish minimum requirements for the design, installation and acceptance testing of smoke control systems that are intended to provide a tenable environment for the evacuation or relocation of occupants. These provisions are not intended for the preservation of contents, the timely restoration of operations, or for assistance in fire suppression or overhaul activities. Smoke control systems regulated by this section serve a different purpose than the smoke and heat removal provisions found in Section 910 of the *International Building Code* or the *International Fire Code*.

[F] 513.2 General design requirements. Buildings, structures, or parts thereof required by the *International Building Code* or the *International Fire Code* to have a smoke control system or systems shall have such systems designed in accordance with the applicable requirements of Section 909 of the *International Building Code* and the generally accepted and well-established principles of engineering relevant to the design. The *construction documents* shall include sufficient information and detail to describe adequately the elements of the design necessary for the proper implementation of the smoke control systems. These documents shall be accompanied with sufficient information and analysis to demonstrate compliance with these provisions.

[S][F] 513.3 Special inspection and test requirements. In addition to the ordinary inspection and test requirements that buildings, structures and parts thereof are required to undergo, smoke control systems subject to the provisions of Section 909 of the *International Building Code* shall undergo special inspections and tests sufficient to verify the proper commissioning of the smoke control design in its final installed condition. The design submission accompanying the *construction documents* shall clearly detail procedures and methods to be used and the items subject to such inspections and tests. Such commissioning shall be in accordance with generally accepted engineering practice and, where possible, based on published standards for the particu-

lar testing involved. The special inspections and tests required by this section shall be conducted under the same terms as found in Section 1704 of the *International Building Code*.

Note: See Seattle Fire Department (SFD) Administrative Rule 9.02.19.

[F] 513.4 Analysis. A rational analysis supporting the types of smoke control systems to be employed, their methods of operation, the systems supporting them and the methods of construction to be utilized shall accompany the submitted *construction documents* and shall include, but not be limited to, the items indicated in Sections 513.4.1 through 513.4.7.

[F] 513.4.1 Stack effect. The system shall be designed such that the maximum probable normal or reverse stack effects will not adversely interfere with the system's capabilities. In determining the maximum probable stack effects, altitude, elevation, weather history and interior temperatures shall be used.

[F] 513.4.2 Temperature effect of fire. Buoyancy and expansion caused by the design fire in accordance with Section 513.9 shall be analyzed. The system shall be designed such that these effects do not adversely interfere with its capabilities.

[F] 513.4.3 Wind effect. The design shall consider the adverse effects of wind. Such consideration shall be consistent with the wind-loading provisions of the *International Building Code*.

[F] 513.4.4 HVAC systems. The design shall consider the effects of the heating, ventilating and air-conditioning (HVAC) systems on both smoke and fire transport. The analysis shall include all permutations of systems' status. The design shall consider the effects of fire on the HVAC systems.

[F] 513.4.5 Climate. The design shall consider the effects of low temperatures on systems, property and occupants. Air inlets and exhausts shall be located so as to prevent snow or ice blockage.

[F] 513.4.6 Duration of operation. All portions of active or engineered smoke control systems shall be capable of continued operation after detection of the fire event for a period of not less than either 20 minutes or 1.5 times the calculated egress time, whichever is greater.

513.4.7 Smoke control system interaction. The design shall consider the interaction effects of the operation of multiple smoke control systems for all design scenarios.

[F] 513.5 Smoke barrier construction. Smoke barriers required for ((~~passive~~)) engineered smoke control and a smoke control system using the pressurization method shall comply with Section 709 of the *International Building Code*. The maximum allowable leakage area shall be the aggregate area calculated using the following leakage area ratios:

1. Walls: $A/A_w = 0.00100$
2. Interior exit stairways and ramps and exit passageways: $A/A_w = 0.00035$
3. Enclosed exit access stairways and ramps and all other shafts: $A/A_w = 0.00150$
4. Floors and roofs: $A/A_F = 0.00050$

where:

A = Total leakage area, square feet (m^2).

A_F = Unit floor or roof area of barrier, square feet (m^2).

A_w = Unit wall area of barrier, square feet (m^2).

The leakage area ratios shown do not include openings created by gaps around doors and operable windows. The total leakage area of the smoke barrier shall be determined in accordance with Section 513.5.1 and tested in accordance with Section 513.5.2.

[F] 513.5.1 Total leakage area. Total leakage area of the barrier is the product of the smoke barrier gross area times the allowable leakage area ratio, plus the area of other openings such as gaps around doors and operable windows.

[F] 513.5.2 Testing of leakage area. Compliance with the maximum total leakage area shall be determined by achieving the minimum air pressure difference across the barrier with the system in the smoke control mode for mechanical smoke control systems utilizing the pressurization method. Compliance with the maximum total leakage area of passive smoke control systems shall be verified through methods such as door fan testing or other methods, as *approved* by the fire code official.

[F] 513.5.3 Opening protection. Openings in smoke barriers shall be protected by automatic-closing devices actuated by the required controls for the mechanical smoke control system. Door openings shall be protected by door assemblies complying with the requirements of the *International Building Code* for doors in smoke barriers.

Exceptions:

1. Passive smoke control systems with automatic-closing devices actuated by spot-type smoke detectors *listed* for releasing service installed in accordance with the *International Building Code*.
2. Fixed openings between smoke zones that are protected utilizing the airflow method.
3. In Group I-1, Condition 2, Group I-2 and ambulatory care facilities, where a pair of opposite-swinging doors are installed across a corridor in accordance with Section 513.5.3.1, the doors shall not be required to be protected in accordance with Section 716 of the *International Building Code*. The doors shall be close-fitting within operational

[F] 513.9 Design fire. The design fire shall be based on a rational analysis performed by the *registered design professional* and *approved* by the code official. The design fire shall be based on the analysis in accordance with Section 513.4 and this section.

[F] 513.9.1 Factors considered. The engineering analysis shall include the characteristics of the fuel, fuel load, effects included by the fire and whether the fire is likely to be steady or unsteady.

[F] 513.9.2 Design fire fuel. Determination of the design fire shall include consideration of the type of fuel, fuel spacing and configuration.

[F] 513.9.3 Heat-release assumptions. The analysis shall make use of the best available data from *approved* sources and shall not be based on excessively stringent limitations of combustible material.

[F] 513.9.4 Sprinkler effectiveness assumptions. A documented engineering analysis shall be provided for conditions that assume fire growth is halted at the time of sprinkler activation.

[F] 513.10 Equipment. *Equipment* such as, but not limited to, fans, ducts, automatic dampers and balance dampers shall be suitable for their intended use, suitable for the probable exposure temperatures that the rational analysis indicates, and as *approved* by the code official.

[F] 513.10.1 Exhaust fans. Components of exhaust fans shall be rated and certified by the manufacturer for the probable temperature rise to which the components will be exposed. This temperature rise shall be computed by:

$T_s = (Q_c/mc) + (T_a)$ **(Equation 5-3)**

where:

c = Specific heat of smoke at smoke-layer temperature, Btu/lb°F (kJ/kg • K).

m = Exhaust rate, pounds per second (kg/s).

Q_c = Convective heat output of fire, Btu/s (kW).

T_a = Ambient temperature, °F (K).

T_s = Smoke temperature, °F (K).

Exception: Reduced T_s as calculated based on the assurance of adequate dilution air.

[F] 513.10.2 Ducts. Duct materials and joints shall be capable of withstanding the probable temperatures and pressures to which they are exposed as determined in accordance with Section 513.10.1. Ducts shall be constructed and supported in accordance with Chapter 6. Ducts shall be leak tested to 1.5 times the maximum design pressure in accordance with nationally accepted practices. Measured leakage shall not exceed 5 percent of design flow. Results of such testing shall be a part of the documentation procedure. Ducts shall be supported directly from fire-resistance-rated structural elements of the building by substantial, noncombustible supports.

Exception: Flexible connections, for the purpose of vibration isolation, that are constructed of *approved* fire-resistance-rated materials.

[F] 513.10.3 Equipment, inlets and outlets. *Equipment* shall be located so as to not expose uninvolved portions of the building to an additional fire hazard. Outdoor air inlets shall be located so as to minimize the potential for introducing smoke or flame into the building. Exhaust outlets shall be so located as to minimize reintroduction of smoke into the building and to limit exposure of the building or adjacent buildings to an additional fire hazard.

[F] 513.10.4 Automatic dampers. Automatic dampers, regardless of the purpose for which they are installed within the smoke control system, shall be *listed* and conform to the requirements of *approved* recognized standards.

[F] 513.10.5 Fans. In addition to other requirements, belt-driven fans shall have 1.5 times the number of belts required for the design duty with the minimum number of belts being two. Fans shall be selected for stable performance based on normal temperature and, where applicable, elevated temperature. Calculations and manufacturer's fan curves shall be part of the documentation procedures. Fans shall be supported and restrained by noncombustible devices in accordance with the structural design requirements of the *International Building Code*. Motors driving fans shall not be operating beyond their nameplate horsepower (kilowatts) as determined from measurement of actual current draw. Motors driving fans shall have a minimum service factor of 1.15.

[S][F] 513.11 ((~~Standby~~)) Emergency power. The smoke control system shall be supplied with ((~~standby~~)) emergency power in accordance with Section 2702 of the *International Building Code*.

[F] 513.11.1 Equipment room. The ((~~standby~~)) emergency power source and its transfer switches shall be in a room separate from the normal power transformers and switch gear and ventilated directly to and from the exterior. The room shall be enclosed with not less than 1-hour fire-resistance-rated fire barriers constructed in accordance with Section 707 of the *International Building Code* or horizontal assemblies constructed in accordance with Section 711 of the *International Building Code*, or both.

[F] 513.11.2 Power sources and power surges. Elements of the smoke management system relying on volatile memories or the like shall be supplied with uninterruptible power sources of sufficient duration to span 15-minute primary power interrup-

tion. Elements of the smoke management system susceptible to power surges shall be suitably protected by conditioners, suppressors or other *approved* means.

[S][F] 513.11.3 Wiring. In addition to meeting requirements of the *Seattle Electrical Code*, all wiring regardless of voltage, shall have fire-resistance-rated protection of at least two hours or as required in rules promulgated by the *code official*.

Exception: Subject to the approval of the *code official*, fire-resistance-rating is not required for wiring located in a parking garage.

[F] 513.12 Detection and control systems. Fire detection systems providing control input or output signals to mechanical smoke control systems or elements thereof shall comply with the requirements of Section 907 of the *International Building Code*. Such systems shall be equipped with a control unit complying with UL 864 and listed as smoke control *equipment*.

[F] 513.12.1 Verification. Control systems for mechanical smoke control systems shall include provisions for verification. Verification shall include positive confirmation of actuation, testing, manual override and the presence of power downstream of all disconnects. A preprogrammed weekly test sequence shall report abnormal conditions audibly, visually and by printed report. The preprogrammed weekly test shall operate all devices, equipment and components used for smoke control.

Exception: Where verification of individual components tested through the preprogrammed weekly testing sequence will interfere with, and produce unwanted effects to, normal building operation, such individual components are permitted to be bypassed from the preprogrammed weekly testing, where *approved* by the building official and in accordance with both of the following:

1. Where the operation of components is bypassed from the preprogrammed weekly test, presence of power downstream of all disconnects shall be verified weekly by a listed control unit.
2. Testing of all components bypassed from the preprogrammed weekly test shall be in accordance with Section 909.20.6 of the *International Fire Code*.

[S][F] 513.12.2 Wiring. ((~~In addition to meeting the requirements of NFPA 70, all wiring, regardless of voltage, shall be fully enclosed within continuous raceways.~~)) See Section 513.11.

[F] 513.12.3 Activation. Smoke control systems shall be activated in accordance with the *International Building Code* or the *International Fire Code*.

[S][F] 513.12.4 Automatic control. Where complete automatic control is required or used, the automatic control sequences shall be initiated from an appropriately zoned automatic sprinkler system complying with Section 903.3.1.1 of the *International Fire Code*, from manual controls provided with *ready access* for the fire department, and any smoke detectors ((~~required by engineering analysis~~)) in the building.

[F] 513.13 Control-air tubing. Control-air tubing shall be of sufficient size to meet the required response times. Tubing shall be flushed clean and dry prior to final connections. Tubing shall be adequately supported and protected from damage. Tubing passing through concrete or masonry shall be sleeved and protected from abrasion and electrolytic action.

[F] 513.13.1 Materials. Control-air tubing shall be hard-drawn copper, Type L, ACR in accordance with ASTM B42, ASTM B43, ASTM B68, ASTM B88, ASTM B251 and ASTM B280. Fittings shall be wrought copper or copper alloy, solder type in accordance with ASME B16.18 or ASME B16.22. Changes in direction shall be made with appropriate tool bends. Copper alloy compression-type fittings shall be used at final connection to devices; other joints shall be brazed using a BCuP5 brazing alloy with solidus above 1,100ºF (593ºC) and liquids below 1,500ºF (816ºC). Brazing flux shall be used on copper-to-copper alloy joints only.

Exception: Nonmetallic tubing used within control panels and at the final connection to devices provided that all of the following conditions are met:

1. Tubing shall comply with the requirements of Section 602.2.1.3.
2. Tubing and connected device shall be completely enclosed within a galvanized or paint-grade steel enclosure having a minimum thickness of 0.0296 inch (0.7534 mm) (No. 22 gage). Entry to the enclosure shall be by copper tubing with a protective grommet of Neoprene or Teflon or by suitable brass compression to male barbed adapter.
3. Tubing shall be identified by appropriately documented coding.
4. Tubing shall be neatly tied and supported within the enclosure. Tubing bridging cabinets and doors or movable devices shall be of sufficient length to avoid tension and excessive stress. Tubing shall be protected against abrasion. Tubing connected to devices on doors shall be fastened along hinges.

[F] 513.13.2 Isolation from other functions. Control tubing serving other than smoke control functions shall be isolated by automatic isolation valves or shall be an independent system.

[F] 513.13.3 Testing. Control-air tubing shall be tested at three times the operating pressure for not less than 30 minutes without any noticeable loss in gauge pressure prior to final connection to devices.

[F] 513.14 Marking and identification. The detection and control systems shall be clearly marked at all junctions, accesses and terminations.

[F] 513.15 Control diagrams. Identical control diagrams shall be provided and maintained as required by the *International Fire Code*.

[F] 513.16 Fire fighter's smoke control panel. A fire fighter's smoke control panel for fire department emergency response purposes only shall be provided in accordance with the *International Fire Code.*

[F] 513.17 System response time. Smoke control system activation shall comply with the *International Fire Code*.

[F] 513.18 Acceptance testing. Devices, *equipment*, components and sequences shall be tested in accordance with the *International Fire Code*.

[F] 513.19 System acceptance. Acceptance of the smoke control system shall be in accordance with the *International Fire Code*.

SECTION 514
ENERGY RECOVERY VENTILATION SYSTEMS

514.1 General. Energy recovery ventilation systems shall be installed in accordance with this section. Where required for purposes of energy conservation, energy recovery ventilation systems shall comply with the *International Energy Conservation Code*. Ducted heat recovery ventilators shall be listed and labeled in accordance with UL 1812. Nonducted heat recovery ventilators shall be listed and labeled in accordance with UL 1815.

514.2 Prohibited applications. Energy recovery ventilation systems shall not be used in the following systems:

1. Hazardous exhaust systems covered in Section 510.
2. Dust, stock and refuse systems that convey explosive or flammable vapors, fumes or dust.
3. Smoke control systems covered in Section 513.
4. Commercial kitchen exhaust systems serving Type I or Type II hoods.
5. Clothes dryer exhaust systems covered in Section 504.

Exception: The application of ERV equipment that recovers sensible heat only utilizing coil-type heat exchangers shall not be limited by this section.

514.3 Access. A means of access shall be provided to the heat exchanger and other components of the system as required for service, maintenance, repair or replacement.

514.4 Recirculated air. Air conveyed within energy recovery systems shall not be considered as recirculated air where the energy recovery ventilation system is constructed to limit cross-leakage between air streams to less than 10 percent of the total airflow design capacity.

[W][S] SECTION 515
WASTE OR LINEN CHUTE VENTING

515.1 Chute venting and roof termination. The full diameter of waste and linen chutes shall extend a minimum of 3 feet (0.92 m) above the building roof and be gravity vented per NFPA 82.

Exceptions:

1. Waste and linen chutes are permitted to be mechanically ventilated by an exhaust fan in lieu of gravity venting. The exhaust fan shall be located outside the building at the top of the chute.
2. Where the trash chute does not extend to the highest floor of the building below the roof, the trash chute shall be permitted to vent to a sidewall louver termination by gravity venting or mechanical venting. The horizontal extension of the trash chute shall have the same cross-sectional area as the chute and shall be enclosed in rated construction equal to the rating of the shaft enclosure. No operable openings shall be located within 10 feet of the sidewall louver termination.

SECTION 602
PLENUMS

[S] 602.1 General. Supply, return, exhaust, relief and ventilation air plenums shall be limited to uninhabited crawl spaces, areas above a ceiling or below the floor, attic spaces, mechanical equipment rooms and the framing cavities addressed in Section 602.3. Plenums shall be limited to one fire area. Air systems that serve multiple *fire areas* shall be ducted from the boundary of the fire area served directly to the air-handling equipment. Fuel-fired appliances shall not be installed within a plenum.

[S] 602.2 Construction. *Plenum* enclosure construction materials that are exposed to the airflow shall comply with the requirements of Section 703.5 of the *International Building Code* or such materials shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723.

The use of gypsum boards to form plenums shall be limited to systems where the air temperatures do not exceed 125ºF (52ºC) and the building and mechanical system design conditions are such that the gypsum board surface temperature will be maintained above the airstream dew-point temperature as determined by the *registered design professional*. Air plenums formed by gypsum boards shall not be incorporated in air-handling systems utilizing evaporative coolers.

602.2.1 Materials within plenums. Except as required by Sections 602.2.1.1 through 602.2.1.8, materials within plenums shall be noncombustible or shall be listed and labeled as having a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723.

Exceptions:

1. Rigid and flexible ducts and connectors shall conform to Section 603.
2. Duct coverings, linings, tape and connectors shall conform to Sections 603 and 604.
3. This section shall not apply to materials exposed within plenums in one- and two-family dwellings.
4. This section shall not apply to smoke detectors.
5. Combustible materials fully enclosed within one of the following:
   - 5.1. Continuous noncombustible raceways or enclosures.
   - 5.2. Approved gypsum board assemblies.
   - 5.3. Materials listed and labeled for installation within a plenum and listed for the application.
6. Materials in Group H, Division 5 fabrication areas and the areas above and below the fabrication area that share a common air recirculation path with the fabrication area.

602.2.1.1 Wiring. Combustible electrical wires and cables and optical fiber cables exposed within a plenum shall be listed and labeled as having a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread distance not greater than 5 feet (1524 mm) when tested in accordance with NFPA 262, or shall be installed in metal raceways or metal sheathed cable. Combustible optical fiber and communication raceways exposed within a plenum shall be listed and labeled as having a peak optical density not greater than 0.5, an average optical density not greater than 0.15, and a flame spread distance not greater than 5 feet (1524 mm) when tested in accordance with UL 2024. Only plenum-rated wires and cables shall be installed in plenum-rated raceways.

602.2.1.2 Fire sprinkler piping. Plastic fire sprinkler piping exposed within a *plenum* shall be used only in wet pipe systems and shall be listed and labeled as having a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread distance not greater than 5 feet (1524 mm) when tested in accordance with UL 1887.

602.2.1.3 Pneumatic tubing. Combustible pneumatic tubing exposed within a *plenum* shall be listed and labeled as having a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread distance not greater than 5 feet (1524 mm) when tested in accordance with UL 1820.

602.2.1.4 Electrical equipment in plenums. Electrical *equipment* exposed within a *plenum* shall comply with Sections 602.2.1.4.1 and 602.2.1.4.2.

602.2.1.4.1 Equipment in metallic enclosures. Electrical *equipment* with metallic enclosures exposed within a *plenum* shall be permitted.

602.2.1.4.2 Equipment in combustible enclosures. Electrical *equipment* with combustible enclosures exposed within a *plenum* shall be *listed* and *labeled* for such use in accordance with UL 2043.

602.2.1.5 Discrete plumbing and mechanical products in plenums. Where discrete plumbing and mechanical products and appurtenances are located in a plenum and have exposed combustible material, they shall be listed and labeled for such use in accordance with UL 2043.

602.2.1.6 Foam plastic in plenums as interior finish or interior trim. Foam plastic in plenums used as interior wall or ceiling finish or interior trim shall exhibit a flame spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E84 or UL 723 at the maximum thickness and density intended for use, and shall be tested in accordance with NFPA 286 and meet the acceptance criteria of Section 803.1.2 of the *International Building*

603.3 Duct classification. Ducts shall be classified based on the maximum operating pressure of the duct at pressures of positive or negative 0.5, 1.0, 2.0, 3.0, 4.0, 6.0 or 10.0 inches (1 inch w.c. = 248.7 Pa) of water column. The pressure classification of ducts shall equal or exceed the design pressure of the air distribution in which the ducts are utilized.

603.4 Metallic ducts. Metallic ducts shall be constructed as specified in the SMACNA *HVAC Duct Construction Standards—Metal and Flexible*.

Exception: Ducts installed within single *dwelling units* shall have a minimum thickness as specified in Table 603.4.

TABLE 603.4
DUCT CONSTRUCTION MINIMUM SHEET METAL THICKNESS FOR SINGLE DWELLING UNITS[a]

ROUND DUCT DIAMETER (inches)	STATIC PRESSURE			
	1/2-inch water gauge		1-inch water gauge	
	Thickness (inches)		Thickness (inches)	
	Galvanized	Aluminum	Galvanized	Aluminum
< 12	0.013	0.018	0.013	0.018
12 to14	0.013	0.018	0.016	0.023
15 to 17	0.016	0.023	0.019	0.027
18	0.016	0.023	0.024	0.034
19 to 20	0.019	0.027	0.024	0.034
RECTANGULAR DUCT DIMENSION (inches)	**STATIC PRESSURE**			
	1/2-inch water gauge		**1-inch water gauge**	
	Thickness (inches)		**Thickness (inches)**	
	Galvanized	**Aluminum**	**Galvanized**	**Aluminum**
≤ 8	0.013	0.018	0.013	0.018
9 to10	0.013	0.018	0.016	0.023
11 to 12	0.016	0.023	0.019	0.027
13 to 16	0.019	0.027	0.019	0.027
17 to 18	0.019	0.027	0.024	0.034
19 to 20	0.024	0.034	0.024	0.034

For SI: 1 inch = 25.4 mm, 1-inch water gauge = 249 Pa.

a. Ductwork that exceeds 20 inches by dimension or exceeds a pressure of 1-inch water gauge shall be constructed in accordance with SMACNA *HVAC Duct Construction Standards—Metal and Flexible*.

603.4.1 Minimum fasteners. Round metallic ducts shall be mechanically fastened by means of not less than three sheet metal screws or rivets spaced equally around the joint.

Exception: Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion so as to prevent a hinge effect.

603.4.2 Duct lap. Crimp joints for round and oval metal ducts shall be lapped not less than 1 inch (25 mm) and the male end of the duct shall extend into the adjoining duct in the direction of airflow.

603.5 Nonmetallic ducts. Nonmetallic ducts shall be constructed with Class 0 or Class 1 duct material and shall comply with UL 181. Fibrous duct construction shall conform to the SMACNA *Fibrous Glass Duct Construction Standards* or NAIMA *Fibrous Glass Duct Construction Standards.* The air temperature within nonmetallic ducts shall not exceed 250ºF (121ºC).

[W][S] 603.5.1 Gypsum ducts. The use of gypsum boards to form air shafts (ducts) shall be limited to return air systems where the air temperatures do not exceed 125ºF (52ºC) and the gypsum board surface temperature is maintained above the airstream dew-point temperature as determined by the *registered design professional*. Air ducts formed by gypsum boards shall not be incorporated in air-handling systems utilizing evaporative coolers.

Exceptions:

1. Gypsum boards are permitted for ducts that are only used for stairway or elevator pressurization supply or relief air. The gypsum duct shall not attach directly to the *equipment*.
2. Gypsum boards coated on the inside with epoxy paint or foil-facing may be used for ventilation systems serving parking garages.
3. Gypsum boards coated on the inside with epoxy paint or foil-facing may be used for *exhaust air* ducts.

Note: Gypsum ducts shall be sealed in accordance with *International Energy Conservation Code* Section C403.7.7.

603.5.2 Phenolic ducts. Nonmetallic phenolic ducts shall be constructed and installed in accordance with the SMACNA *Phenolic Duct Construction Standards*.

603.6 Flexible air ducts and flexible air connectors. Flexible air ducts, both metallic and nonmetallic, shall comply with Sections 603.6.1, 603.6.1.1, 603.6.3 and 603.6.4. Flexible air connectors, both metallic and nonmetallic, shall comply with Sections 603.6.2 through 603.6.4.

603.6.1 Flexible air ducts. Flexible air ducts, both metallic and nonmetallic, shall be tested in accordance with UL 181. Such ducts shall be *listed* and *labeled* as Class 0 or Class 1 flexible air ducts and shall be installed in accordance with Section 304.1.

603.6.1.1 Duct length. Flexible air ducts shall not be limited in length.

603.6.2 Flexible air connectors. Flexible air connectors, both metallic and nonmetallic, shall be tested in accordance with UL 181. Such connectors shall be *listed* and *labeled* as Class 0 or Class 1 flexible air connectors and shall be installed in accordance with Section 304.1.

603.6.2.1 Connector length. Flexible air connectors shall be limited in length to 14 feet (4267 mm).

603.6.2.2 Connector penetration limitations. Flexible air connectors shall not pass through any wall, floor or ceiling.

603.6.3 Air temperature. The design temperature of air to be conveyed in flexible air ducts and flexible air connectors shall be less than 250ºF (121ºC).

603.6.4 Flexible air duct and air connector clearance. Flexible air ducts and air connectors shall be installed with a minimum *clearance* to an *appliance* as specified in the *appliance* manufacturer's installation instructions.

603.7 Rigid duct penetrations. Duct system penetrations of walls, floors, ceilings and roofs and air transfer openings in such building components shall be protected as required by Section 607. Ducts in a private garage that penetrate a wall or ceiling that separates a dwelling from a private garage shall be continuous, shall be constructed of sheet steel having a thickness of not less than 0.0187 inch (0.4712 mm) (No. 26 gage) and shall not have openings into the garage. Fire and smoke dampers are not required in such ducts passing through the wall or ceiling separating a dwelling from a private garage except where required by Chapter 7 of the *International Building Code*.

603.8 Underground ducts. Ducts shall be *approved* for underground installation. Metallic ducts not having an *approved* protective coating shall be completely encased in not less than 2 inches (51 mm) of concrete.

603.8.1 Slope. Ducts shall have a minimum slope of 1/8 inch per foot (10.4 mm/m) to allow drainage to a point provided with access.

603.8.2 Sealing. Ducts shall be sealed, secured and tested prior to concrete encasement or direct burial. Ducts shall be leak tested as required by Section C403 of the *International Energy Conservation Code*.

603.8.3 Plastic ducts and fittings. Plastic ducts shall be constructed of PVC having a minimum pipe stiffness of 8 psi (55 kPa) at 5-percent deflection when tested in accordance with ASTM D2412. Plastic duct fittings shall be constructed of either PVC or high-density polyethylene. Plastic duct and fittings shall be utilized in underground installations only. The maximum design temperature for systems utilizing plastic duct and fittings shall be 150°F (66°C).

603.9 Joints, seams and connections. Longitudinal and transverse joints, seams and connections in metallic and nonmetallic ducts shall be constructed as specified in SMACNA *HVAC Duct Construction Standards—Metal and Flexible* and NAIMA *Fibrous Glass Duct Construction Standards*. Joints, longitudinal and transverse seams and connections in ductwork shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems, liquid sealants or tapes. Tapes and mastics used to seal fibrous glass ductwork shall be listed and labeled in accordance with UL 181A and shall be marked "181 A-P" for pressure-sensitive tape, "181 A-M" for mastic or "181 A-H" for heat-sensitive tape. Tapes and mastics used to seal metallic and flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked "181 B-FX" for pressure-sensitive tape or "181 B-M" for mastic. Duct connections to flanges of air distribution system equipment shall be sealed and mechanically fastened. Mechanical fasteners for use with flexible nonmetallic air ducts shall comply with UL 181B and shall be marked "181 B-C." Closure systems used to seal all ductwork shall be installed in accordance with the manufacturer's instructions.

Exception: For ducts having a static pressure classification of less than 2 inches of water column (500 Pa), additional closure systems shall not be required for continuously welded joints and seams and locking-type joints and seams. This exception shall not apply to snap-lock and button-lock type joints and seams located outside of conditioned spaces.

603.10 Supports. Ducts shall be supported in accordance with SMACNA *HVAC Duct Construction Standards—Metal and Flexible*. Flexible and other factory-made ducts shall be supported in accordance with the manufacturer's instructions.

[S] 603.10.1 Seismic loads. Bracing for ducts shall be designed to resist seismic loading, using accepted engineering practices and Chapter 16 of the *International Building Code.*

Interpretation: Duct bracing that complies with the SMACNA guideline "Seismic Restraint Manual Guidelines for Mechanical Systems" is deemed to comply with Section 603.10 and the *International Building Code*.

603.11 Furnace connections. Ducts connecting to a furnace shall have a *clearance* to combustibles in accordance with the furnace manufacturer's installation instructions.

603.12 Condensation. Provisions shall be made to prevent the formation of condensation on the exterior of any duct.

[BS] 603.13 Flood hazard areas. For structures in flood hazard areas, ducts shall be located above the elevation required by Section 1612 of the *International Building Code* for utilities and attendant equipment or shall be designed and constructed to prevent water from entering or accumulating within the ducts during floods up to such elevation. If the ducts are located below the elevation required by Section 1612 of the *International Building Code* for utilities and attendant equipment, the ducts shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.

[S] 603.14 Location. Ducts shall not be installed in or within 4 inches (102 mm) of the earth, except where such ducts comply with Section 603.8. Ducts installed in parking garages shall provide a clear floor height of not less than 6 feet 6 inches at the vehicle and pedestrian traffic areas, except where a minimum vertical *clearance* of 98 inches must be provided for required van-accessible parking spaces, access aisles serving them, and vehicular routes between the van-accessible parking spaces and the garage entrance and exit.

603.15 Mechanical protection. Ducts installed in locations where they are exposed to mechanical damage by vehicles or from other causes shall be protected by *approved* barriers.

603.16 Weather protection. Ducts including linings, coverings and vibration isolation connectors installed on the exterior of the building shall be protected against the elements.

603.17 Air dispersion systems. Air dispersion systems shall:

1. Be installed entirely in exposed locations.
2. Be utilized in systems under positive pressure.
3. Not pass through or penetrate fire-resistant-rated construction.
4. Be listed and labeled in compliance with UL 2518.

603.18 Registers, grilles and diffusers. Duct registers, grilles and diffusers shall be installed in accordance with the manufacturer's instructions. Volume dampers or other means of supply air adjustment shall be provided in the branch ducts or at each individual duct register, grille or diffuser. Each volume damper or other means of supply air adjustment used in balancing shall be provided with access.

603.18.1 Floor registers. Floor registers shall resist, without structural failure, a 200-pound (90.8 kg) concentrated load on a 2-inch-diameter (51 mm) disc applied to the most critical area of the exposed face.

603.18.2 Prohibited locations. Diffusers, registers and grilles shall be prohibited in the floor or its upward extension within toilet and bathing rooms required by the *International Building Code* to have smooth, hard, nonabsorbent surfaces.

Exception: *Dwelling units*.

SECTION 604
INSULATION

604.1 General. Duct insulation shall conform to the requirements of Sections 604.2 through 604.13 and the *International Energy Conservation Code*.

604.2 Surface temperature. Ducts that operate at temperatures exceeding 120°F (49°C) shall have sufficient thermal insulation to limit the exposed surface temperature to 120°F (49°C).

604.3 Coverings and linings. Coverings and linings, including adhesives where used, shall have a flame spread index not more than 25 and a smoke-developed index not more than 50, when tested in accordance with ASTM E84 or UL 723, using the specimen preparation and mounting procedures of ASTM E2231. Duct coverings and linings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250°F (121°C). Coverings and linings shall be listed and labeled.

604.4 Foam plastic insulation. Foam plastic used as duct coverings and linings shall conform to the requirements of Section 604.

604.5 Appliance insulation. *Listed* and *labeled* appliances that are internally insulated shall be considered as conforming to the requirements of Section 604.

604.6 Penetration of assemblies. Duct coverings shall not penetrate a wall or floor required to have a fire-resistance rating or required to be fireblocked.

604.7 Identification. External duct insulation, except spray polyurethane foam, and factory-insulated flexible duct shall be legibly printed or identified at intervals not greater than 36 inches (914 mm) with the name of the manufacturer, the thermal resistance *R*-value at the specified installed thickness and the flame spread and smoke-developed indices of the composite materials. Duct insulation product *R*-values shall be based on insulation only, excluding air films, vapor retarders or other duct components, and shall be based on tested *C*-values at 75ºF (24ºC) mean temperature at the installed thickness, in accordance with rec-

ognized industry procedures. The installed thickness of duct insulation used to determine its *R*-value shall be determined as follows:

1. For duct board, duct liner and factory-made rigid ducts not normally subjected to compression, the nominal insulation thickness shall be used.
2. For duct wrap, the installed thickness shall be assumed to be 75 percent (25 percent compression) of nominal thickness.
3. For factory-made flexible air ducts, the installed thickness shall be determined by dividing the difference between the actual outside diameter and nominal inside diameter by two.
4. For spray polyurethane foam, the aged *R*-value per inch, measured in accordance with recognized industry standards, shall be provided to the customer in writing at the time of foam application.

604.8 Lining installation. Linings shall be interrupted at the area of operation of a fire damper and at not less than 6 inches (152 mm) upstream of and 6 inches (152 mm) downstream of electric-resistance and fuel-burning heaters in a duct system. Metal nosings or sleeves shall be installed over exposed duct liner edges that face opposite the direction of airflow.

604.9 Thermal continuity. Where a duct liner has been interrupted, a duct covering of equal thermal performance shall be installed.

604.10 Service openings. Service openings shall not be concealed by duct coverings unless the exact location of the opening is properly identified.

604.11 Vapor retarders. Where ducts used for cooling are externally insulated, the insulation shall be covered with a vapor retarder having a maximum permeance of 0.05 perm [2.87 ng/(Pa • s • m^2)] or aluminum foil having a minimum thickness of 2 mils (0.051 mm). Insulations having a permeance of 0.05 perm [2.87 ng/(Pa • s • m^2)] or less shall not be required to be covered. Joints and seams shall be sealed to maintain the continuity of the vapor retarder.

Exception: A vapor retarder is not required for spray polyurethane foam insulation having a water vapor permeance of not greater than 3 perms per inch [1722 ng/(s • m^2 • Pa)] at the installed thickness.

604.12 Weatherproof barriers. Insulated exterior ducts shall be protected with an *approved* weatherproof barrier.

604.13 Internal insulation. Materials used as internal insulation and exposed to the airstream in ducts shall be shown to be durable when tested in accordance with UL 181. Exposed internal insulation that is not impermeable to water shall not be used to line ducts or plenums from the exit of a cooling coil to the downstream end of the drain pan.

SECTION 605
AIR FILTERS

[W] 605.1 General. Heating and air-conditioning systems shall be provided with *approved* air filters. Filters shall be installed such that all return air, outdoor air and makeup air is filtered upstream from any heat exchanger or coil. Filters shall be installed in an *approved* convenient location. Liquid adhesive coatings used on filters shall have a flash point not lower than 325ºF (163ºC).

Exception: Cooling coils that are designed, controlled and operated to provide sensible cooling only do not require filtration at the terminal device.

605.2 Approval. Media-type and electrostatic-type air filters shall be *listed* and *labeled*. Media-type air filters shall comply with UL 900. High-efficiency particulate air filters shall comply with UL 586. Electrostatic-type air filters shall comply with UL 867. Air filters utilized within *dwelling units* shall be designed for the intended application and shall not be required to be *listed* and *labeled*.

605.3 Airflow over the filter. Ducts shall be constructed to allow an even distribution of air over the entire filter.

[S] 605.4 Particulate matter removal. Particulate matter filters or air cleaners having a minimum efficiency reporting value (MERV) of not less than 6 for ducted air handlers and not less than 4 for ductless mini-split systems shall be provided upstream of all cooling coils or other devices with wetted surfaces through which air is supplied to an occupiable space.

[S] 605.5 Smoke filtration. Air handlers and energy recovery ventilators serving occupiable spaces each with individual capacity greater than 500 cfm shall provide a filter box capable of housing a filter with a minimum efficiency reporting value (MERV) of not less than 13.

Exception: Air handlers that process 100 percent recirculated air with no outdoor air are not required to comply with this section.

SECTION 606
SMOKE DETECTION SYSTEMS CONTROL

606.1 Controls required. Air distribution systems shall be equipped with smoke detectors *listed* and *labeled* for installation in air distribution systems, as required by this section. Duct smoke detectors shall comply with UL 268A. Other smoke detectors shall comply with UL 268.

[S] 606.2 Where required. Smoke detectors shall be installed where indicated in Sections 606.2.1 through ((~~606.2.3~~)) 606.2.5.

Exception: Smoke detectors shall not be required where air distribution systems are incapable of spreading smoke beyond the enclosing walls, floors and ceilings of the room or space in which the smoke is generated.

[S] 606.2.1 Return air systems. Smoke detectors shall be installed in return air systems with a design capacity greater than 2,000 cfm (0.9 m^3/s), in the return air duct or *plenum* upstream of any filters, *exhaust air* connections, outdoor air connections, or decontamination *equipment* and appliances.

Exceptions:

1. Smoke detectors are not required in the return air system where all portions of the building served by the air distribution system are protected by area smoke detectors connected to a fire alarm system in accordance with the *International Fire Code*. The area smoke detection system shall comply with Section 606.4.
2. Smoke detectors are not required in the air system where all of the air is exhausted and not recirculated back to any portion of the building. Additionally, smoke detectors are not required in the supply system that provide the *makeup air* for the exhaust system.

[S] 606.2.2 Common supply and return air systems. Where multiple air-handling systems share common supply or return air ducts or plenums with a combined design capacity greater than 2,000 cfm (0.9 m^3/s), the return air system shall be provided with smoke detectors in accordance with Section 606.2.1.

Exception: Individual smoke detectors shall not be required for each fan-powered terminal unit, provided that such units do not have an individual design capacity greater than 2,000 cfm (0.9 m^3/s) and will be shut down by activation of one of the following:

1. Smoke detectors required by Sections 601.2, 606.2.1 and 606.2.3.
2. An *approved* area smoke detector system located in the return air *plenum* serving such units.
3. An area smoke detector system as prescribed in the exception to Section 606.2.1.

((~~In all cases, the smoke detectors shall comply with Sections 606.4 and 606.4.1.~~))

The shutdown of fan-powered terminal units may be performed by a building automation system upon activation of smoke detection as described in Section 606.2.2, Exception Items 1, 2, or 3. The building automation system is not required to be *listed* as a smoke control system and is not required to comply with UL Standard 864: Standard for Control Units and Accessories for Fire Alarm Systems.

606.2.3 Return air risers. Where return air risers serve two or more stories and serve any portion of a return air system having a design capacity greater than 15,000 cfm (7.1 m^3/s), smoke detectors shall be installed at each story. Such smoke detectors shall be located upstream of the connection between the return air riser and any air ducts or plenums.

[W] 606.2.4 Corridors serving Group R occupancies in other than high-rise buildings. Corridors that serve Group R occupancies in other than high-rise buildings and that are mechanically ventilated with supply air shall be equipped with smoke detectors spaced in accordance with NFPA 72. The supply fan shall automatically shut off upon activation of the corridor smoke detectors.

Exception: Corridor smoke detection is not required when air is returned back to the supply fan from the corridor and return air smoke detectors are installed in the return air duct or plenum upstream of any filters, exhaust air connections, outdoor air connections, or decontamination equipment and appliances designed to automatically shut off the supply fan.

[W] 606.2.5 Corridors serving Group R occupancies in high-rise buildings. Corridors that serve Group R occupancies in high-rise buildings and that are mechanically ventilated with supply air shall be equipped with smoke detectors that are spaced in accordance with NFPA 72 and air supply inlets to the corridor shall be provided with smoke/fire dampers. The supply inlet smoke/fire dampers shall automatically close upon activation of the corridor smoke detectors.

Exceptions:

1. Corridor smoke detection is not required to close the supply inlet smoke/fire dampers when the smoke/fire dampers are used as part of an approved building stairwell or elevator hoistway pressurization smoke control system.
2. Corridor smoke detection is not required when air is returned back to the supply fan from the corridor and return air smoke detectors are installed in the return air duct or plenum upstream of any filters, exhaust air connections, outdoor air connections, or decontamination equipment and appliances designed to automatically shut off the supply fan.

[F] 606.3 Installation. Smoke detectors required by this section shall be installed in accordance with NFPA 72. The required smoke detectors shall be installed to monitor the entire airflow conveyed by the system including return air and exhaust or relief air. Access shall be provided to smoke detectors for inspection and maintenance.

[F] 606.4 Controls operation. Upon activation, the smoke detectors shall shut down all operational capabilities of the air distribution system in accordance with the listing and labeling of appliances used in the system. Air distribution systems that are part of a smoke control system shall switch to the smoke control mode upon activation of a detector.

[S][F] 606.4.1 Supervision. The duct smoke detectors shall be connected to ((~~a fire alarm system~~)) the building's fire alarm control unit where a fire alarm system is required by Section 907.2 of the *International Fire Code*. Duct detectors shall not activate a fire alarm signal. The actuation of a duct smoke detector shall activate a visible and audible supervisory signal at a constantly attended location. In facilities that are required to be monitored by a supervising station, duct smoke detectors shall report only as a supervisory signal, not as a fire alarm.

Exceptions:

1. The supervisory signal at a constantly attended location is not required where the duct smoke detector activates the building's alarm-indicating appliances.
2. In occupancies not required to be equipped with a fire alarm system, actuation of a smoke detector shall activate a visible and audible signal in an *approved* location. Duct smoke detector trouble conditions shall activate a visible or audible signal in an *approved* location and shall be identified as air duct detector trouble.

SECTION 607
DUCT AND TRANSFER OPENINGS

[BF] 607.1 General. The provisions of this section shall govern the protection of duct penetrations and air transfer openings in assemblies required to be protected.

[BF] 607.1.1 Ducts between shafts. Ducts transitioning horizontally between shafts shall not require a shaft enclosure provided that the duct penetration into each associated shaft is protected with dampers complying with this section.

[BF] 607.1.2 Ducts that penetrate fire-resistance-rated assemblies without dampers. Ducts that penetrate fire-resistance-rated walls and are not required by this section to have fire dampers shall comply with the requirements of Sections 714.3 through 714.4.3 of the *International Building Code*. Ducts that penetrate horizontal assemblies not required to be contained within a shaft and not required by this section to have fire dampers shall comply with the requirements of Section 714.5 of the *International Building Code*.

[BF] 607.1.2.1 Ducts that penetrate nonfire-resistance-rated assemblies. The space around a duct penetrating a nonfire-resistance-rated floor assembly shall comply with Section 717.6.3 of the *International Building Code*.

[BF] 607.2 Installation. Fire dampers, smoke dampers, combination fire/smoke dampers and ceiling radiation dampers located within air distribution and smoke control systems shall be installed in accordance with the requirements of this section, and the manufacturer's instructions and listing.

[BF] 607.2.1 Smoke control system. Where the installation of a fire damper will interfere with the operation of a required smoke control system in accordance with Section 909 of the *International Building Code*, *approved* alternative protection shall be used. Where mechanical systems including ducts and dampers used for normal building ventilation serve as part of the smoke control system, the expected performance of these systems in smoke control mode shall be addressed in the rational analysis required by Section 909.4 of the *International Building Code*.

607.2.2 Hazardous exhaust ducts. Fire dampers for hazardous exhaust duct systems shall comply with Section 510.

[BF] 607.3 Damper testing, ratings and actuation. Damper testing, ratings and actuation shall be in accordance with Sections 607.3.1 through 607.3.3.5.

[BF] 607.3.1 Damper testing. *Dampers* shall be listed and labeled in accordance with the standards in this section. *Fire dampers* shall comply with the requirements of UL 555. Only *fire* dampers labeled for use in dynamic systems shall be installed in heating, ventilating and air-conditioning systems designed to operate with fans on during a fire. *Smoke dampers* shall comply with the requirements of UL 555S. *Combination fire/smoke dampers* shall comply with the requirements of both UL 555 and UL 555S. *Ceiling radiation dampers* shall comply with the requirements of UL 555C or shall be tested as part of a fire-resistance-rated floor/ceiling or roof/ceiling assembly in accordance with ASTM E119 or UL 263. Only ceiling radiation dampers labeled for use in dynamic systems shall be installed in heating, ventilation and air-conditioning systems designed to operate with fans on during a fire. Corridor dampers shall comply with requirements of both UL 555 and UL 555S. Corridor dampers shall demonstrate acceptable closure performance when subjected to 150 feet per minute (0.76 mps) velocity across the face of the damper using the UL 555 fire exposure test.

[BF] 607.3.2 Damper rating. Damper ratings shall be in accordance with Sections 607.3.2.1 through 607.3.2.4.

[BF] 607.3.2.1 Fire damper ratings. Fire dampers shall have the minimum rating specified in Table 607.3.2.1.

[BF] TABLE 607.3.2.1
FIRE DAMPER RATING

TYPE OF PENETRATION	MINIMUM DAMPER RATING (hour)
Less than 3-hour fire-resistance-rated assemblies	1-1/2
3-hour or greater fire-resistance-rated assemblies	3

[BF] 607.3.2.2 Smoke damper ratings. Smoke damper leakage ratings shall be Class I or II. Elevated temperature ratings shall be not less than 250°F (121°C).

[BF] 607.3.2.3 Combination fire/smoke damper ratings. Combination fire/smoke dampers shall have the minimum rating specified for fire dampers in Table 607.3.2.1 and shall have the minimum rating specified for smoke dampers in Section 607.3.2.2.

[BF] 607.3.2.4 Corridor damper ratings. Corridor dampers shall have the following minimum ratings.

1. One-hour fire-resistance rating.
2. Class I or II leakage rating as specified in Section 607.3.2.2.

[BF] 607.3.3 Damper actuation. Damper actuation shall be in accordance with Sections 607.3.3.1 through 607.3.3.5 as applicable.

[BF] 607.3.3.1 Fire damper actuation device. The fire damper actuation device shall meet one of the following requirements:

1. The operating temperature shall be approximately 50°F (28°C) above the normal temperature within the duct system, but not less than 160°F (71°C).
2. The operating temperature shall be not more than 350°F (177°C) where located in a smoke control system complying with Section 909 of the *International Building Code.*

Informative Note: Dampers associated with exhaust fans used for hoistway and stairway pressurization are permitted to comply with Section 607.3.3.1, item 2.

[BF] 607.3.3.2 Smoke damper actuation. The smoke damper shall close upon actuation of a *listed* smoke detector or detectors installed in accordance with Section 907.3 of the *International Building Code* and one of the following methods, as applicable:

1. Where a smoke damper is installed within a duct, a smoke detector shall be installed inside the duct or outside the duct with sampling tubes protruding into the duct. The detector or tubes within the duct shall be within 5 feet (1524 mm) of the damper. Air outlets and inlets shall not be located between the detector or tubes and the damper. The detector shall be *listed* for the air velocity, temperature and humidity anticipated at the point where it is installed. Other than in mechanical smoke control systems, dampers shall be closed upon fan shutdown where local smoke detectors require a minimum velocity to operate.
2. Where a smoke damper is installed above smoke barrier doors in a smoke barrier, a spot-type detector shall be installed on either side of the smoke barrier door opening. The detector shall be listed for releasing service if used for direct interface with the damper.
3. Where a smoke damper is installed within an unducted opening in a wall, a spot-type detector shall be installed within 5 feet (1524 mm) horizontally of the damper. The detector shall be listed for releasing service if used for direct interface with the damper.
4. Where a smoke damper is installed in a corridor wall or ceiling, the damper shall be permitted to be controlled by a smoke detection system installed in the corridor.
5. Where a smoke detection system is installed in all areas served by the duct in which the damper will be located, the smoke dampers shall be permitted to be controlled by the smoke detection system.

[BF] 607.3.3.3 Combination fire/smoke damper actuation. Combination fire/smoke damper actuation shall be in accordance with Sections 607.3.3.1 and 607.3.3.2. Combination fire/smoke dampers installed in smoke control system shaft penetrations shall not be activated by local area smoke detection unless it is secondary to the smoke management system controls.

[BF] 607.3.3.4 Ceiling radiation damper actuation. The operating temperature of a ceiling radiation damper actuation device shall be 50°F (28°C) above the normal temperature within the duct system, but not less than 160°F (71°C).

[BF] 607.3.3.5 Corridor damper actuation. Corridor damper actuation shall be in accordance with Sections 607.3.3.1 and 607.3.3.2.

tion, a ducted HVAC system shall be a duct system for conveying supply, return or exhaust air as part of the structure's HVAC system. Such a duct system shall be constructed of sheet steel not less than 26 gage in thickness and shall be continuous from the air-handling appliance or equipment to the air outlet and inlet terminals.

[BF] 607.5.4 Corridors/smoke barriers. A *listed* smoke damper designed to resist the passage of smoke shall be provided at each point a duct or air transfer opening penetrates a smoke barrier wall or a corridor enclosure required to have smoke and draft control doors in accordance with the *International Building Code*.

A corridor damper shall be provided where corridor ceilings, constructed as required for the corridor walls as permitted in Section 708.4, Exception 3, of the *International Building Code*, are penetrated.

A ceiling radiation damper shall be provided where the ceiling membrane of a fire-resistance-rated floor/ceiling or roof/ceiling assembly, constructed as permitted in Section 708.4, Exception 2, of the *International Building Code*, is penetrated.

Smoke dampers and smoke damper actuation methods shall comply with Section 607.5.4.1.

Exceptions:

1. Smoke dampers are not required in corridor penetrations where the building is equipped throughout with an *approved* smoke control system in accordance with Section 513 and smoke dampers are not necessary for the operation and control of the system.
2. Smoke dampers are not required in smoke barrier penetrations where the openings in ducts are limited to a single smoke compartment and the ducts are constructed of steel.
3. Smoke dampers are not required in corridor penetrations where the duct is constructed of steel not less than 0.019 inch (0.48 mm) in thickness and there are no openings serving the corridor.
4. Smoke dampers are not required in smoke barriers required by Section 407.5 of the *International Building Code* for Group I-2, Condition 2 where the HVAC system is fully ducted in accordance with Section 603 and where buildings are equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Building Code* and equipped with quick-response sprinklers in accordance with Section 903.3.2 of the *International Building Code*.

[BF] 607.5.4.1 Smoke damper. Smoke dampers shall close as required by Section 607.3.3.2.

[S][BF] 607.5.5 Shaft enclosures. Shaft enclosures that are permitted to be penetrated by ducts and air transfer openings shall be protected with listed fire and smoke dampers installed in accordance with their listing.

Exceptions:

1. Fire dampers are not required at penetrations of shafts where any of the following apply:
   1.1. Steel exhaust subducts extend not less than 22 inches (559 mm) vertically in exhaust shafts provided that there is a continuous airflow upward to the outdoors.
   1.2. Penetrations are tested in accordance with ASTM E119 or UL 263 as part of the fire-resistance-rated assembly.
   1.3. Ducts are used as part of an *approved* smoke control system in accordance with Section 909 of the *International Building Code*, and where the fire damper will interfere with the operation of the smoke control system.
   1.4. The penetrations are in parking garage exhaust or supply shafts that are separated from other building shafts by not less than 2-hour fire-resistance-rated construction.
2. In Group B and R occupancies equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Building Code*, smoke dampers are not required at penetrations of shafts where kitchen, clothes dryer, bathroom, ((~~and~~)) toilet room, accessory storage, and accessory trash room exhaust openings with steel exhaust subducts, having a minimum thickness of 0.0187 inch (0.4712 mm) (No. 26 gage), extend not less than 22 inches (559 mm) vertically and the exhaust fan at the upper terminus is ((~~powered continuously in accordance with the provisions of Section 909.11 of the *International Building Code*~~)) provided with a legally required standby power system in accordance with *Seattle Electrical Code* Section 701, and maintains airflow upward to the outdoors.
3. Smoke dampers are not required at penetrations of exhaust or supply shafts in parking garages that are separated from other building shafts by not less than 2-hour fire-resistance-rated construction.
4. Smoke dampers are not required at penetrations of shafts where ducts are used as part of an *approved* mechanical smoke control system designed in accordance with Section 909 of the *International Building Code* and where the smoke damper will interfere with the operation of the smoke control system.
5. Fire dampers and combination fire/smoke dampers are not required in kitchen and clothes dryer exhaust systems where dampers are prohibited by this code.

CHAPTER 7

COMBUSTION AIR

User note:

About this chapter: *Chapter 7 defers to the* International Fuel Gas Code® *for combustion air provisions for gas-fired appliances. This code addresses oil-fired and solid-fuel-fired appliances; therefore, Chapter 7 is brief, referring to the manufacturer for solid-fuel appliances and NFPA 31 for oil-fired appliances. Combustion air must be provided to appliances to prevent poor combustion that can create multiple health and safety hazards.*

SECTION 701
GENERAL

[S] 701.1 Scope. This chapter shall apply to oil-burning *appliances* and *equipment* to ensure that adequate air for safe *combustion* is provided. Solid fuel-burning *appliances*, *fireplaces* and *fireplace stoves* shall be provided with *combustion air* in accordance with the appliance manufacturer's installation instructions and *International Building Code* Section 2111. ((~~Oil-fired *appliances* shall be provided with *combustion air* in accordance with NFPA 31. The methods of providing *combustion air* in this chapter do not apply to fireplaces, fireplace stoves and direct~~)) Direct-vent *appliances* shall be provided with *combustion* air in accordance with the appliance manufacturer's installation instructions. The requirements for combustion and dilution air for gas-fired *appliances* shall be in accordance with the *International Fuel Gas Code*.

701.2 Dampered openings. Where combustion air openings are provided with volume, smoke or fire dampers, the dampers shall be interlocked with the firing cycle of the appliances served, so as to prevent operation of any appliance that draws combustion air from the room or space when any of the dampers are closed. Manual dampers shall not be installed in combustion air ducts. Ducts not provided with dampers and that pass through rated construction shall be enclosed in a shaft in accordance with the *International Building Code*.

[S] 701.3 Oil-burning appliance and equipment installation location. Oil-burning appliances and *equipment* shall be installed in locations where available ventilation permits satisfactory *combustion* of oil, proper venting of *combustion* gases, and maintenance of safe ambient temperatures under normal conditions of use. Appliances shall be located so that they do not interfere with the supply of air within the space.

Note: The provisions of Chapter 7 are based on NFPA 31-2016.

[S] 701.4 Tight construction. Where buildings are so tight that normal infiltration does not provide sufficient air for *combustion*, outside air shall be introduced.

[S] 701.5 Combustion air ducts. *Combustion* air ducts shall:

1. Be of galvanized steel complying with Chapter 6 or of equivalent corrosion-resistant material *approved* for this application.

   Exception: Within *dwelling units*, unobstructed stud and joist spaces shall not be prohibited from conveying *combustion* air, provided that not more than one required fireblock is removed.

2. Have a minimum cross-sectional dimension of 3 inches (76 mm).
3. Terminate in an unobstructed space allowing free movement of *combustion* air to the appliances.
4. Have the same cross-sectional areas as the free area of the openings to which they connect.
5. Serve a single appliance enclosure.
6. Not serve both upper and lower *combustion* air openings where both such openings are used. The separation between ducts serving upper and lower *combustion* air openings shall be maintained to the source of *combustion* air.
7. Not be screened where terminating in an attic space.
8. Not slope downward toward the source of *combustion* air, where serving the upper required *combustion* air opening.

[S] 701.6 Prohibited sources. Openings and ducts shall not connect appliance enclosures with a space in which the operation of a fan will adversely affect the flow of the *combustion* air. *Combustion* air shall not be obtained from a hazardous location, except where the fuel-fired appliances are located within the hazardous location and are installed in accordance with this code. *Combustion* air shall not be taken from a refrigeration *machinery room*, except where a refrigerant vapor detector system is installed to

automatically shut off the *combustion* process in the event of refrigerant leakage. *Combustion* air shall not be obtained from any location below the *design flood elevation.*

[S] 701.7 Opening location and protection. *Combustion* air openings to the outdoors shall comply with the location and protection provisions of Sections 401.4 and 401.5 applicable to outdoor air intake openings.

[S] SECTION 702
APPLIANCES LOCATED IN UNCONFINED SPACES

[S] 702.1 Unconfined spaces. In *unconfined spaces* air for *combustion* and ventilation shall be obtained directly from outdoors or from spaces that freely communicate with outdoors by means of a permanent opening or openings having a total free area of not less than 1 in.^{2} per 5000 Btu/hr (28 in.^{2} per gal/hr) (4.4 cm^2 kW), based on the total input rating of all appliances in the space.

Exception: In buildings built prior to the 1986 edition of the *Washington State Energy Code with Seattle Amendments*, air for *combustion* shall be permitted to be supplied by normal infiltration.

[S] SECTION 703
APPLIANCES LOCATED IN CONFINED SPACES

[S] 703.1 Confined spaces. For appliances installed in confined spaces, air for *combustion* and ventilation shall be provided using one of the methods set forth in this section.

[S] 703.2 All air taken from inside the building. Where all *combustion* air will be taken from inside the building, the confined space shall be provided with two permanent openings as shown in Figure 703.2.1, one near the top of the space and one near the bottom.

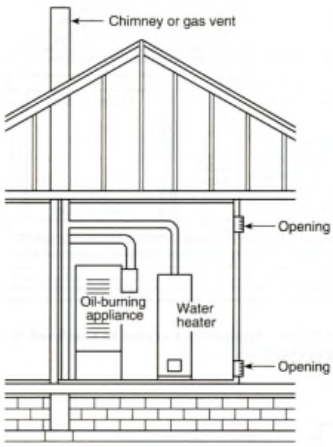


FIGURE 703.2.1
APPLIANCES LOCATED IN CONFINED SPACES – ALL AIR TAKEN FROM INSIDE THE BUILDING

[S] 703.2.1 Size of openings. Each opening shall have a free area of not less than 1 in.^{2} per 1000 Btu/hr (140 in.^{2} per gal/hr) (22 cm^2/kW), based on the total input rating of all appliances in the space.

[S] 703.2.2 Source of air. Each opening shall freely communicate with interior areas of the building that, in turn, have adequate infiltration from the outside.

[S] 703.3 All air taken from outdoors. Where all air will be taken from outdoors, the confined space shall be provided with two permanent openings, one near the top of the space and one in or near the bottom.

[S] 703.3.1 Source of air. The openings shall communicate directly or by means of ducts with the outdoors or to spaces such as an attic or crawl space, that themselves freely communicate with the outdoors, as shown in Figure 703.3.2.1, Figure 703.3.2.2, and Figure 703.3.2.3.

[S] 703.3.2 Vertical ducts. Where communicating with the outdoors directly or by means of vertical ducts, each opening shall have a free area of not less than 1 inch^2 per 4000 Btu/hr (35 inch^2 per gal/hr) (5.5 cm^2/kW), based on the total input rating of all appliances in the space.

[S] 703.3.3 Horizontal ducts. Where communicating with the outdoors by means of horizontal ducts, each opening shall have a free area of not less than 1 inch² per 2000 Btu/hr (70 inch² per gal/hr) (11 cm²/kW), based on the total input rating of all appliances in the space.

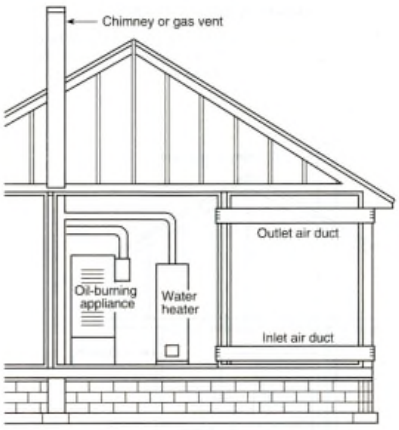


FIGURE 703.3.2.1
APPLIANCES LOCATED IN CONFINED SPACES – ALL AIR FROM OUTDOORS

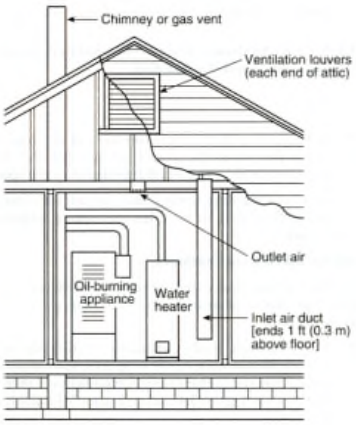
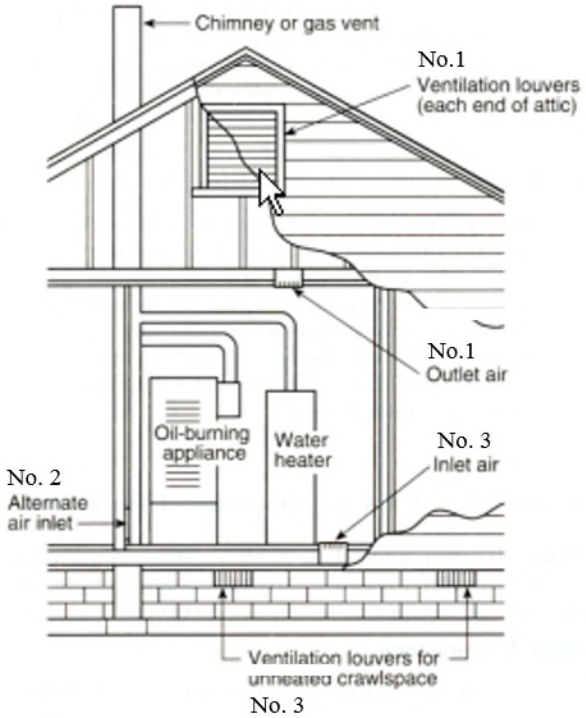


FIGURE 703.3.2.2
APPLIANCES LOCATED IN CONFINED SPACES – ALL AIR FROM OUTDOORS THROUGH VENTILATED ATTIC



Notes:

- Ducts used for make-up air can be connected to the cold air return of the heating system only if they connect directly to outdoor air.
- Nos. 1, 2, and 3 mark alternate locations for air from outdoors.
- Provide attic ventilation louvers at each end of attic with alternate air inlet No. 1.
- Provide crawl space ventilation louvers for unheated crawl space with alternate air inlet No. 3.

FIGURE 703.3.2.3
APPLIANCES LOCATED IN CONFINED SPACES, WITH VENTILATION AIR FROM INSIDE BUILDING AND COMBUSTION AIR FROM OUTSIDE, VENTILATED ATTIC, OR VENTILATED CRAWL SPACE.

[S] 703.4 Ventilation air taken from inside the building—Combustion air taken from outdoors. Where *ventilation air* will be taken from inside the building and *combustion* air will be taken from outdoors, the confined space shall be provided with two openings for ventilation, located and sized as specified in Section 703.2 and as shown in Figure 703.3.2.3. In addition, there shall be one opening communicating directly with the outdoors or to spaces, such as an attic or crawl space, that freely communicates with the outdoors and has a free area of not less than 1 in.^{2} per 5000 Btu/hr (28 in.^{2} per gal/hr) (4.4 cm^2/kW), based on the total input of all appliances in the space.

[S] SECTION 704
COMBUSTION AIR FOR COMMERCIAL AND INDUSTRIAL INSTALLATIONS

[S] 704.1 General. For commercial and industrial oil-burning *equipment*, permanent means for supplying an ample amount of outside air shall be provided in accordance with this section.

[S] 704.2 Size of openings. For furnace or boiler rooms adjacent to outside walls and where *combustion* air is provided by *natural ventilation* from the outside, there shall be a permanent air supply inlet having a total free area of not less than 1 in.^{2} per 4000 Btu/hr (35 in.^{2} per gal/hr) (5.5 cm^2/kW), based on the total input rating of the burner or burners, but in no case less than 35 in.^{2} (0.425 m^2). For furnace or boiler rooms that are not adjacent to outside walls, the *combustion* air shall be supplied in a manner acceptable to the building official.

[S] SECTION 705
LOUVERS AND GRILLES

[S] 705.1 Louvers and grilles. In calculating the free area required by Sections 701, 702, 703 and 704, the blocking effect of louvers, grilles, or screens protecting openings shall be taken into consideration.

[S] 705.2 Screens. Screens used in louvers or grilles shall not be smaller than 1/4 in (6.3 mm) mesh and shall be accessible for cleaning.

[S] 705.3 Size of openings. If the free area through a particular design of louver or grille is known, it shall be used in calculating the size of the opening needed to provide the free area required. If the free area of the design is not known, it shall be assumed that wood louvers will have 20 percent to 25 percent free area and metal louvers and grilles will have 60 percent to 75 percent free area.

[S] SECTION 706
SPECIAL CONDITIONS

[S] 706.1 Special conditions. Where an appliance is installed in a location where the operation of exhaust fans, kitchen ventilation systems, clothes dryers or fireplaces can create conditions of unsatisfactory *combustion* or venting, special provisions shall be made subject to the approval of the building official.

SECTION 804
DIRECT-VENT, INTEGRAL VENT AND MECHANICAL DRAFT SYSTEMS

804.1 Direct-vent terminations. Vent terminals for *direct-vent appliances* shall be installed in accordance with the manufacturer's instructions.

804.2 Appliances with integral vents. *Appliances* incorporating integral venting means shall be installed in accordance with their listings and the manufacturer's installation instructions.

804.2.1 Terminal clearances. *Appliances* designed for natural draft venting and incorporating integral venting means shall be located so that a minimum *clearance* of 9 inches (229 mm) is maintained between vent terminals and from any openings through which *combustion* products enter the building. *Appliances* using forced draft venting shall be located so that a minimum clearance of 12 inches (305 mm) is maintained between vent terminals and from any openings through which *combustion* products enter the building.

804.3 Mechanical draft systems. Mechanical draft systems of either forced or induced draft design shall be listed and labeled in accordance with UL 378 and shall comply with Sections 804.3.1 through 804.3.8.

804.3.1 Forced draft systems. Forced draft systems and all portions of induced draft systems under positive pressure during operation shall be designed and installed so as to be gas tight to prevent leakage of *combustion* products into a building.

804.3.2 Automatic shutoff. Power exhausters serving automatically fired *appliances* shall be electrically connected to each *appliance* to prevent operation of the *appliance* when the power exhauster is not in operation.

804.3.3 Termination. The termination of *chimneys* or vents equipped with power exhausters shall be located not less than 10 feet (3048 mm) from the lot line or from adjacent buildings. The exhaust shall be directed away from the building.

[S] 804.3.4 Horizontal terminations. Horizontal terminations shall comply with the following requirements:

1. Where located adjacent to walkways, the termination of mechanical draft systems shall be not less than ((~~7~~)) 10 feet (((~~2134~~)) 3048 mm) above the level of the walkway.
2. Vents shall terminate not less than 3 feet (914 mm) above any forced air inlet located within 10 feet (3048 mm).
3. The vent system shall terminate not less than 4 feet (1219 mm) below, 4 feet (1219 mm) horizontally from or 1 foot (305 mm) above any door, window or gravity air inlet into the building.
4. The vent termination point shall not be located closer than 3 feet (914 mm) to an interior corner formed by two walls perpendicular to each other.
5. The vent termination shall not be mounted directly above or within 3 feet (914 mm) horizontally from an oil tank vent or gas meter.
6. The bottom of the vent termination shall be located not less than 12 inches (305 mm) above finished grade.

[S] 804.3.5 Vertical terminations. Vertical terminations shall comply with the following requirements:

1. Where located adjacent to walkways, the termination of mechanical draft systems shall be not less than ((~~7~~)) 10 feet (((~~2134~~)) 3048 mm) above the level of the walkway.
2. Vents shall terminate not less than 3 feet (914 mm) above any forced air inlet located within 10 feet (3048 mm). ((~~horizontally.~~))
3. Where the vent termination is located below an adjacent roof structure, the termination point shall be located not less than 3 feet (914 mm) from such structure.
4. The vent shall terminate not less than 4 feet (1219 mm) below, 4 feet (1219 mm) horizontally from or 1 foot (305 mm) above any door, window or gravity air inlet for the building.
5. A vent cap shall be installed to prevent rain from entering the vent system.
6. The vent termination shall be located not less than 3 feet (914 mm) horizontally from any portion of the roof structure.

804.3.6 Exhauster connections. An *appliance* vented by natural draft shall not be connected into a vent, *chimney* or vent connector on the discharge side of a mechanical flue exhauster.

804.3.7 Exhauster sizing. Mechanical flue exhausters and the vent system served shall be sized and installed in accordance with the manufacturer's installation instructions.

804.3.8 Mechanical draft systems for manually fired appliances and fireplaces. A mechanical draft system shall be permitted to be used with manually fired appliances and fireplaces where such system complies with all of the following requirements:

1. The mechanical draft device shall be listed and labeled in accordance with UL 378, and shall be installed in accordance with the manufacturer's instructions.
2. A device shall be installed that produces visible and audible warning upon failure of the mechanical draft device or loss of electrical power, at any time that the mechanical draft device is turned on. This device shall be equipped with a battery backup if it receives power from the building wiring.

be tested in accordance with UL 1482. Fireplace inserts intended for installation in fireplaces shall be *listed* and *labeled* in accordance with the requirements of UL 1482 and shall be installed in accordance with the manufacturer's instructions.

905.2 Connection to fireplace. The connection of solid fuel appliances to *chimney* flues serving fireplaces shall comply with Sections 801.7 and 801.10.

905.3 Hearth extensions. Hearth extensions for fireplace stoves shall be installed in accordance with the listing of the fireplace stove. The hearth extension shall be readily distinguishable from the surrounding floor area. Listed and labeled hearth extensions shall comply with UL 1618.

SECTION 906
FACTORY-BUILT BARBECUE APPLIANCES

906.1 General. Factory-built barbecue appliances shall be of an *approved* type and shall be installed in accordance with the manufacturer's instructions, this chapter and Chapters 3, 5, 7 and 8, and the *International Fuel Gas Code*.

SECTION 907
INCINERATORS AND CREMATORIES

907.1 General. Incinerators and crematories shall be *listed* and *labeled* in accordance with UL 791 and shall be installed in accordance with the manufacturer's instructions.

SECTION 908
COOLING TOWERS, EVAPORATIVE CONDENSERS AND FLUID COOLERS

908.1 General. A cooling tower used in conjunction with an air-conditioning *appliance* shall be installed in accordance with the manufacturer's instructions. Factory-built cooling towers shall be listed in accordance with UL 1995.

908.2 Access. Cooling towers, evaporative condensers and fluid coolers shall be provided with ready access.

908.3 Location. Cooling towers, evaporative condensers and fluid coolers shall be located to prevent the discharge vapor plumes from entering occupied spaces. Plume discharges shall be not less than 5 feet (1524 mm) above or 20 feet (6096 mm) away from any ventilation inlet to a building. Location on the property shall be as required for buildings in accordance with the *International Building Code*.

908.4 Support and anchorage. Supports for cooling towers, evaporative condensers and fluid coolers shall be designed in accordance with the *International Building Code*. Seismic restraints shall be as required by the *International Building Code*.

[S] 908.5 Water supply. Cooling towers, evaporative coolers and fluid coolers shall be provided with an approved water supply, sized for peak demand. The quality of water shall be provided in accordance with the equipment manufacturer's recommendations. The piping system and protection of the potable water supply system shall be installed as required by the ((~~*International*~~)) *Uniform Plumbing Code*.

908.6 Drainage. Drains, overflows and blowdown provisions shall be indirectly connected to an *approved* disposal location. Discharge of chemical waste shall be *approved* by the appropriate regulatory authority.

908.7 Refrigerants and hazardous fluids. Heat exchange *equipment* that contains a refrigerant and that is part of a closed refrigeration system shall comply with Chapter 11. Heat exchange *equipment* containing heat transfer fluids which are flammable, combustible or hazardous shall comply with the *International Fire Code*.

908.8 Cooling towers. Cooling towers, both open circuit and closed circuit type, and evaporative condensers shall comply with Sections 908.8.1 and 908.8.2.

908.8.1 Conductivity or flow-based control of cycles of concentration. Cooling towers and evaporative condensers shall include controls that automate system bleed based on conductivity, fraction of metered makeup volume, metered bleed volume, recirculating pump run time or bleed time.

908.8.2 Drift eliminators. Cooling towers and evaporative condensers shall be equipped with drift eliminators that have a maximum drift rate of 0.005 percent of the circulated water flow rate as established in the equipment's design specifications.

SECTION 909
VENTED WALL FURNACES

909.1 General. Vented wall furnaces shall be installed in accordance with their listing and the manufacturer's instructions. Oil-fired furnaces shall be tested in accordance with UL 730.

ranges shall be *listed* and *labeled* in accordance with UL 858. Microwave cooking appliances shall be *listed* and *labeled* in accordance with UL 923. Oil-burning stoves shall be *listed* and *labeled* in accordance with UL 896. Solid-fuel-fired ovens shall be *listed* and *labeled* in accordance with UL 2162.

917.2 Domestic appliances. Cooking appliances installed within *dwelling units* and within areas where domestic cooking operations occur shall be *listed* and *labeled* as household-type appliances for domestic use.

[S] SECTION 918
((~~FORCED-AIR WARM-AIR FURNACES~~)) AIR HANDLING UNITS

918.1 Forced-air furnaces. Oil-fired furnaces shall be tested in accordance with UL 727. Electric furnaces shall be tested in accordance with UL 1995. Solid fuel furnaces shall be tested in accordance with UL 391. Forced-air furnaces shall be installed in accordance with the listings and the manufacturer's instructions.

918.2 Heat pumps. Electric heat pumps shall be tested in accordance with UL 1995.

918.3 Dampers. Volume dampers shall not be placed in the air inlet to a furnace in a manner that will reduce the required air to the furnace.

918.4 Circulating air ducts for forced-air warm-air furnaces. Circulating air for fuel-burning, forced-air-type, warm-air furnaces shall be conducted into the blower housing from outside the furnace enclosure by continuous air-tight ducts.

918.5 Outdoor and return air openings. Outdoor intake openings shall be located in accordance with Section 401.4. Return air openings shall be located in accordance with Section 601.5.

918.6 Outdoor opening protection. Outdoor air intake openings shall be protected in accordance with Section 401.5.

SECTION 919
CONVERSION BURNERS

919.1 Conversion burners. The installation of conversion burners shall conform to ANSI Z21.8.

SECTION 920
UNIT HEATERS

920.1 General. Unit heaters shall be installed in accordance with the listing and the manufacturer's instructions. Oil-fired unit heaters shall be tested in accordance with UL 731.

920.2 Support. Suspended-type unit heaters shall be supported by elements that are designed and constructed to accommodate the weight and dynamic loads. Hangers and brackets shall be of noncombustible material. Suspended-type oil-fired unit heaters shall be installed in accordance with NFPA 31.

920.3 Ductwork. A unit heater shall not be attached to a warm-air duct system unless *listed* for such installation.

SECTION 921
VENTED ROOM HEATERS

921.1 General. Vented room heaters shall be *listed* and *labeled* and shall be installed in accordance with the conditions of the listing and the manufacturer's instructions.

SECTION 922
KEROSENE AND OIL-FIRED STOVES

922.1 General. Kerosene and oil-fired stoves shall be listed and labeled and shall be installed in accordance with the conditions of the listing and the manufacturer's instructions. Kerosene and oil-fired stoves shall comply with NFPA 31 and UL 896.

SECTION 923
SMALL CERAMIC KILNS

923.1 General. Kilns shall be listed and labeled unless otherwise approved in accordance with Section 105.2. Electric kilns shall comply with UL 499. The approval of unlisted appliances in accordance with Section 105.2 shall be based on approved engineering evaluation.

923.1.1 Installation. Kilns shall be installed in accordance with the manufacturer's instructions and the provisions of this code.

SECTION 924
STATIONARY FUEL CELL POWER SYSTEMS

924.1 General. Stationary fuel cell power systems having a power output not exceeding 10 MW shall be tested in accordance with ANSI/CSA America FC 1 and shall be installed in accordance with the manufacturer's instructions, NFPA 853, the *International Building Code* and the *International Fire Code*.

SECTION 925
MASONRY HEATERS

925.1 General. Masonry heaters shall be constructed in accordance with the *International Building Code*.

SECTION 926
GASEOUS HYDROGEN SYSTEMS

926.1 Installation. The installation of gaseous hydrogen systems shall be in accordance with the applicable requirements of this code, the *International Fire Code*, the *International Fuel Gas Code* and the *International Building Code*.

SECTION 927
RADIANT HEATING SYSTEMS

927.1 General. Electric radiant heating systems shall be installed in accordance with the manufacturer's instructions and shall be listed for the application.

[S] 927.2 Clearances. Clearances for radiant heating panels or elements to any wiring, outlet boxes and junction boxes used for installing electrical devices or mounting luminaires shall be in accordance with the *International Building Code* and ((~~NFPA 70~~)) the *Seattle Electrical Code*.

927.3 Installation on wood or steel framing. Radiant panels installed on wood or steel framing shall conform to the following requirements:

1. Heating panels shall be installed parallel to framing members and secured to the surface of framing members or shall be mounted between framing members.
2. Mechanical fasteners shall penetrate only the unheated portions provided for this purpose. Panels shall not be fastened at any point closer than 1/4 inch (6.4 mm) to an element. Other methods of attachment of the panels shall be in accordance with the panel installation instructions.
3. Unless listed and labeled for field cutting, heating panels shall be installed as complete units.

927.4 Installation in concrete or masonry. Radiant heating systems installed in concrete or masonry shall conform to the following requirements:

1. Radiant heating systems shall be identified as being suitable for the installation, and shall be secured in place as specified in the manufacturer's instructions.
2. Radiant heating panels and radiant heating panel sets shall not be installed where they bridge expansion joints unless they are protected from expansion and contraction.

927.5 Finish surfaces. Finish materials installed over radiant heating panels and systems shall be installed in accordance with the manufacturer's instructions. Surfaces shall be secured so that fasteners do not pierce the radiant heating elements.

SECTION 928
EVAPORATIVE COOLING EQUIPMENT

928.1 General. Evaporative cooling equipment shall:

1. Be installed in accordance with the manufacturer's instructions.
2. Be installed on level platforms in accordance with Section 304.10.
3. Have openings in exterior walls or roofs flashed in accordance with the *International Building Code*.
4. Be provided with an approved water supply, sized for peak demand. The quality of water shall be provided in accordance with the equipment manufacturer's recommendations. The piping system and protection of the potable water supply system shall be installed as required by the *International Plumbing Code*.
5. Have air intake opening locations in accordance with Section 401.4.

CHAPTER 11

REFRIGERATION

User note:

About this chapter: *Chapter 11 provides for the protection of life and property from the potential fire and health hazards associated with refrigerant chemicals and the machinery that contains such chemicals. Some refrigerants are toxic, some are flammable and some are both. This chapter refers to the* International Fire Code®*, ASHRAE 15 and IIAR standards 2 through 5.*

SECTION 1101
GENERAL

[S] 1101.1 Scope. This chapter shall govern the design, installation, construction and repair of refrigeration systems that vaporize and liquefy a fluid during the refrigerating cycle. Refrigerant piping design and installation, including pressure vessels and pressure relief devices, shall conform to this code and the Seattle Boiler and Pressure Vessel Code. Permanently installed refrigerant storage systems and other components shall be considered as part of the refrigeration system to which they are attached.

1101.2 Factory-built equipment and appliances. *Listed* and *labeled* self-contained, factory-built *equipment* and appliances shall be tested in accordance with UL 207, 412, 471 or 1995. Such *equipment* and appliances are deemed to meet the design, manufacture and factory test requirements of this code if installed in accordance with their listing and the manufacturer's instructions.

1101.3 Protection. Any portion of a refrigeration system that is subject to physical damage shall be protected in an *approved* manner.

[S] 1101.4 Water connection. Water supply and discharge connections associated with refrigeration systems shall be made in accordance with this code and the ((~~*International*~~)) *Uniform Plumbing Code*.

1101.5 Fuel gas connection. Fuel gas devices, *equipment* and appliances used with refrigeration systems shall be installed in accordance with the *International Fuel Gas Code.*

1101.6 General. Refrigeration systems shall comply with the requirements of this code and, except as modified by this code, ASHRAE 15. Ammonia-refrigerating systems shall comply with this code and, except as modified by this code, ASHRAE 15, IIAR 2, IIAR 3, IIAR 4 and IIAR 5.

1101.7 Maintenance. Mechanical refrigeration systems shall be maintained in proper operating condition, free from accumulations of oil, dirt, waste, excessive corrosion, other debris and leaks.

1101.8 Change in refrigerant type. The type of refrigerant in refrigeration systems having a refrigerant circuit containing more than 220 pounds (99.8 kg) of Group A1 or 30 pounds (13.6 kg) of any other group refrigerant shall not be changed without prior notification to the code official and compliance with the applicable code provisions for the new refrigerant type.

[F] 1101.9 Refrigerant discharge. Notification of refrigerant discharge shall be provided in accordance with the *International Fire Code*.

1101.10 Locking access port caps. Refrigerant circuit access ports located outdoors shall be fitted with locking-type tamper-resistant caps or shall be otherwise secured to prevent unauthorized access.

Exception: This section shall not apply to refrigerant circuit access ports on equipment installed in controlled areas such as on roofs with locked access hatches or doors.

SECTION 1102
SYSTEM REQUIREMENTS

1102.1 General. The system classification, allowable refrigerants, maximum quantity, enclosure requirements, location limitations, and field pressure test requirements shall be determined as follows:

1. Determine the refrigeration system's classification, in accordance with Section 1103.3.
2. Determine the refrigerant classification in accordance with Section 1103.1.
3. Determine the maximum allowable quantity of refrigerant in accordance with Section 1104, based on type of refrigerant, system classification and *occupancy*.
4. Determine the system enclosure requirements in accordance with Section 1104.
5. Refrigeration *equipment* and *appliance* location and installation shall be subject to the limitations of Chapter 3.

1103.3.2 High-probability systems. Direct systems and indirect open-spray systems shall be classified as high-probability systems.

Exception: An indirect open-spray system shall not be required to be classified as a high-probability system if the pressure of the secondary coolant is at all times (operating and standby) greater than the pressure of the refrigerant.

SECTION 1104
SYSTEM APPLICATION REQUIREMENTS

1104.1 General. The refrigerant, occupancy and system classification cited in this section shall be determined in accordance with Sections 1103.1, 1103.2 and 1103.3, respectively.

1104.2 Machinery room. Except as provided in Sections 1104.2.1 and 1104.2.2, all components containing the refrigerant shall be located either outdoors or in a *machinery room* where the quantity of refrigerant in an independent circuit of a system exceeds the amounts shown in Table 1103.1. For refrigerant blends not listed in Table 1103.1, the same requirement shall apply where the amount for any blend component exceeds that indicated in Table 1103.1 for that component. This requirement shall also apply where the combined amount of the blend components exceeds a limit of 69,100 parts per million (ppm) by volume. Machinery rooms required by this section shall be constructed and maintained in accordance with Section 1105 for Group A1 and B1 refrigerants and in accordance with Sections 1105 and 1106 for Group A2, B2, A3 and B3 refrigerants.

Exceptions:

1. Machinery rooms are not required for *listed equipment* and appliances containing not more than 6.6 pounds (3 kg) of refrigerant, regardless of the refrigerant's safety classification, where installed in accordance with the equipment's or appliance's listing and the *equipment* or *appliance* manufacturer's installation instructions.
2. Piping in conformance with Section 1107 is allowed in other locations to connect components installed in a *machinery room* with those installed outdoors.

1104.2.1 Institutional occupancies. The amounts shown in Table 1103.1 shall be reduced by 50 percent for all areas of institutional occupancies except kitchens, laboratories and mortuaries. The total of all Group A2, B2, A3 and B3 refrigerants shall not exceed 550 pounds (250 kg) in occupied areas or machinery rooms.

[S] 1104.2.2 Industrial occupancies and refrigerated rooms. This section applies only to rooms and spaces that: are within industrial occupancies; contain a refrigerant evaporator; are maintained at temperatures below 68°F (20°C); and are used for manufacturing, food and beverage preparation, meat cutting, other processes and storage. Where a machinery room would otherwise be required by Section 1104.2, a machinery room shall not be required where all of the following conditions are met:

1. The space containing the machinery is separated from other occupancies by tight construction with tight-fitting doors.
2. Access is restricted to authorized personnel.
3. Refrigerant detectors are installed as required for machinery rooms in accordance with Section 1105.3.

   Exceptions:

   1. Refrigerant detectors are not required in unoccupied areas that contain only continuous piping that does not include valves, valve assemblies, equipment, or equipment connections.
   2. Where approved alternatives are provided, refrigerant detectors for ammonia refrigeration are not required for rooms or areas that are always occupied, and for rooms or areas that have high humidity or other harsh environmental conditions that are incompatible with detection devices.
4. Surfaces having temperatures exceeding 800°F (427°C) and open flames are not present where any Group A2, B2, A3 or B3 refrigerant is used (see Section 1104.3.4).
5. All electrical *equipment* and appliances conform to Class 1, Division 2, hazardous location classification requirements of ((~~NFPA 70~~)) the *Seattle Electrical Code* where the quantity of any Group A2, B2, A3 or B3 refrigerant, other than ammonia, in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
6. All refrigerant-containing parts in systems with a total connected compressor power exceeding 100 horsepower (hp) (74.6 kW)—except evaporators used for refrigeration or dehumidification, condensers used for heating, control and pressure relief valves for either, low-probability pumps and connecting piping—are located either outdoors or in a *machinery room*.

1104.3 Refrigerant restrictions. Refrigerant applications, maximum quantities and use shall be restricted in accordance with Sections 1104.3.1 through 1104.3.4.

1104.3.1 Air-conditioning for human comfort. In other than industrial occupancies where the quantity in a single independent circuit does not exceed the amount in Table 1103.1, Group B1, B2 and B3 refrigerants shall not be used in high-probability systems for air-conditioning for human comfort.

1104.3.2 Nonindustrial occupancies. Group A2 and B2 refrigerants shall not be used in high-probability systems where the quantity of refrigerant in any independent refrigerant circuit exceeds the amount shown in Table 1104.3.2. Group A3 and B3 refrigerants shall not be used except where *approved*.

Exception: This section does not apply to laboratories where the floor area per occupant is not less than 100 square feet (9.3 m^2).

TABLE 1104.3.2
MAXIMUM PERMISSIBLE QUANTITIES OF REFRIGERANTS

TYPE OF REFRIGERATION SYSTEM	MAXIMUM POUNDS FOR VARIOUS OCCUPANCIES			
	Institutional	Assembly	Residential	All other occupancies
Sealed absorption system				
In exit access	0	0	3.3	3.3
In adjacent outdoor locations	0	0	22	22
In other than exit access	0	6.6	6.6	6.6
Unit systems				
In other than exit access	0	0	6.6	6.6

For SI: 1 pound = 0.454 kg.

1104.3.3 All occupancies. The total of all Group A2, B2, A3 and B3 refrigerants other than R-717, ammonia, shall not exceed 1,100 pounds (499 kg) except where *approved*.

1104.3.4 Protection from refrigerant decomposition. Where any device having an open flame or surface temperature greater than 800°F (427°C) is used in a room containing more than 6.6 pounds (3 kg) of refrigerant in a single independent circuit, a hood and exhaust system shall be provided in accordance with Section 510. Such exhaust system shall exhaust *combustion* products to the outdoors.

Exception: A hood and exhaust system shall not be required where any of the following apply:

1. The refrigerant is R-717, R-718 or R-744.
2. The *combustion* air is ducted from the outdoors in a manner that prevents leaked refrigerant from being combusted.
3. A refrigerant detector is used to stop the *combustion* in the event of a refrigerant leak (see Sections 1105.3 and 1105.5).

1104.4 Volume calculations. Volume calculations shall be in accordance with Sections 1104.4.1 through 1104.4.3.

1104.4.1 Noncommunicating spaces. Where the refrigerant-containing parts of a system are located in one or more spaces that do not communicate through permanent openings or HVAC ducts, the volume of the smallest, enclosed occupied space shall be used to determine the permissible quantity of refrigerant in the system.

1104.4.2 Communicating spaces. Where an evaporator or condenser is located in an air duct system, the volume of the smallest, enclosed occupied space served by the duct system shall be used to determine the maximum allowable quantity of refrigerant in the system.

Exception: If airflow to any enclosed space cannot be reduced below one-quarter of its maximum, the entire space served by the air duct system shall be used to determine the maximum allowable quantity of refrigerant in the system.

[S] 1104.4.3 Plenums. Where the space above a suspended ceiling is continuous and part of the supply or return air *plenum* system, this space shall be included in calculating the volume of the enclosed space.

Interpretation: For variable refrigerant flow systems, the total allowable quantity of refrigerant in the system includes the refrigerant in the condensing unit, refrigerant controller, fan coil, and all associated piping.

SECTION 1105
MACHINERY ROOM, GENERAL REQUIREMENTS

[BF] 1105.1 Design and construction. Machinery rooms shall be designed and constructed in accordance with the *International Building Code* and this section.

1105.2 Openings. Ducts and air handlers in the *machinery room* that operate at a lower pressure than the room shall be sealed to prevent any refrigerant leakage from entering the airstream.

[S][F] 1105.3 Refrigerant ((~~detector~~)) detection system. ((~~Refrigerant detectors in machinery rooms shall be provided as required by Sections 605.8 and 605.17 of the *International Fire Code*.~~)) Refrigeration *machinery rooms* shall contain a refrigerant detection system with an audible and visual alarm. The detector, or a sampling tube that draws air to the detector, shall be located in an area where refrigerant from a leak will concentrate. The alarm shall be actuated at a value not greater than the corresponding TLV-TWA values shown in this code for the refrigerant classification. Detectors and alarms shall be placed in *approved* locations. The detectors shall transmit a signal to an *approved* location.

1105.4 Tests. Periodic tests of the mechanical ventilating system shall be performed in accordance with manufacturer's specifications and as required by the code official.

1105.5 Fuel-burning appliances. Fuel-burning appliances and *equipment* having open flames and that use *combustion* air from the *machinery room* shall not be installed in a *machinery room*.

Exceptions:

1. Where the refrigerant is carbon dioxide or water.
2. Fuel-burning appliances shall not be prohibited in the same *machinery room* with refrigerant-containing *equipment* or appliances where *combustion* air is ducted from outside the *machinery room* and sealed in such a manner as to prevent any refrigerant leakage from entering the *combustion* chamber, or where a refrigerant vapor detector is employed to automatically shut off the *combustion* process in the event of refrigerant leakage.

[S] 1105.6 Ventilation. Machinery rooms shall ((~~be mechanically ventilated~~)) have continuous mechanical ventilation to the outdoors.

Informative Note: The requirement for continuous mechanical ventilation to the outdoors means that fire dampers are not allowed on *machinery room* ventilation ducts.

Exception: Where a refrigerating system is located outdoors more than 20 feet (6096 mm) from any building opening and is enclosed by a penthouse, lean-to or other open structure, natural ((~~or mechanical~~)) ventilation shall be ((~~provided~~)) permitted. There shall be no openings to the building. Location of the openings shall be based on the relative density of the refrigerant to air. The free-aperture cross section for the ventilation of the *machinery room* shall be not less than:

$$F = \sqrt{G} \qquad \textbf{(Equation 11-1)}$$

For SI: $F = 0.138\sqrt{G}$

where:

F = The free opening area in square feet (m^2).

G = The mass of refrigerant in pounds (kg) in the largest system, any part of which is located in the *machinery room*.

1105.6.1 Discharge location. The discharge of the air shall be to the outdoors in accordance with Chapter 5. Exhaust from mechanical ventilation systems shall be discharged not less than 20 feet (6096 mm) from a property line or openings into buildings.

1105.6.1.1 Indoor exhaust opening location. Indoor mechanical exhaust intake openings shall be located where refrigerant leakage is likely to concentrate based on the refrigerant's relative density to air, and the locations of the air current paths and refrigerating machinery.

1105.6.2 Makeup air. Provisions shall be made for *makeup air* to replace that being exhausted. Openings for *makeup air* shall be located to avoid intake of *exhaust air*. Supply and exhaust ducts to the *machinery room* shall not serve any other area, shall be constructed in accordance with Chapter 5 and shall be covered with corrosion-resistant screen of not less than 1/4-inch (6.4 mm) mesh.

[W][S] 1105.6.3 Ventilation rate other than ammonia systems. For other than ammonia systems, the mechanical ventilation systems shall be capable of exhausting the minimum quantity of air both at normal operating and emergency conditions, as required by Sections 1105.6.3.1 and 1105.6.3.2. ((~~The minimum required emergency ventilation rate for ammonia shall be 30 air changes per hour in accordance with IIAR2.~~)) Multiple fans or multispeed fans shall be allowed to produce the emergency ventilation rate and to obtain a reduced airflow for normal ventilation.

[S] 1105.6.3.1 Quantity—normal ventilation. During occupied conditions, the mechanical ventilation system shall exhaust the larger of the following:

1. Not less than 0.5 cfm per square foot (0.0025 $m^3/s \cdot m^2$) of *machinery room* area. ((~~or 20 cfm (0.009 m^3/s) per person.~~))
2. A volume required to limit the room temperature rise to 18°F (10°C) taking into account the ambient heating effect of all machinery in the room.
3. Not less than 20 cfm (0.009 m^3/s) per *person.*

[S] 1105.6.3.1.1 Quantity—unoccupied condition. During unoccupied conditions, the mechanical ventilation system is permitted to exhaust the larger of the following:

1. Not less than 0.25 cfm per square foot (0.00125 $m^3/s \cdot m^2$) of *machinery room* area; or
2. A volume required to limit the room temperature rise to 18°F (10°C) taking into account the ambient heating effect of all machinery in the room.

The system shall be provided with controls that increase the ventilation to the rate required for occupied spaces when the space is illuminated.

1105.6.3.2 Quantity—emergency conditions. Upon actuation of the refrigerant detector required in Section 1105.3, the mechanical ventilation system shall *exhaust air* from the *machinery room* in the following quantity:

$Q = 100 \times \sqrt{G}$ **(Equation 11-2)**

For SI: $Q = 0.07 \times \sqrt{G}$

where:

Q = The airflow in cubic feet per minute (m^3/s).

G = The design mass of refrigerant in pounds (kg) in the largest system, any part of which is located in the *machinery room*.

[S] 1105.6.4 Ventilation rate—ammonia. The minimum required normal and emergency ventilation rates for ammonia shall be in accordance with IIAR2 and Sections 1105.6.4.1 and 1105.6.4.2.

[S] 1105.6.4.1 Quantity—normal ventilation. During normal conditions, the mechanical ventilation system shall exhaust the larger of the following:

1. Not less than 2 cfm per square foot (0.01 $m^3/s \cdot m^2$) of *machinery room* area; or
2. A volume required to limit the room temperature rise to 18°F (10°C) taking into account the ambient heating effect of all machinery in the room; or
3. Not less than 5 air changes per hour.

[S] 1105.6.4.2 Quantity—emergency conditions. Upon actuation of the refrigerant detector required in Section 1105.3, the mechanical ventilation system shall exhaust air from the *machinery room* at a rate of not less than 30 air changes per hour or in accordance with IIAR 2.

[S][F] 1105.6.5 Standby source of power required. Where *mechanical ventilation*, treatment systems, temperature control, alarm, detection or other electrically operated systems are required, such systems shall be provided with a legally required standby source of power. See the *International Building Code* Chapter 27 and *Seattle Electrical Code* Article 701.

Exception: Legally required standby power is not required where an *approved* fail-safe engineered system is installed.

[S] 1105.7 Termination of relief devices. Pressure relief devices, fusible plugs and purge systems located within the *machinery room* shall terminate outside of the structure at a location not less than 15 feet (4572 mm) above the adjoining grade level and not less than 20 feet (6096 mm) from any window, ventilation opening or exit.

For additional requirements regarding termination of relief devices for flammable refrigerants, toxic and highly toxic refrigerants, ammonia refrigerant, treatment systems, flaring systems, and ammonia diffusion systems, see Section 606 of the *International Fire Code*.

1105.8 Ammonia discharge. Pressure relief valves for ammonia systems shall discharge in accordance with ASHRAE 15.

[F] 1105.9 Emergency pressure control system. Permanently installed refrigeration systems containing more than 6.6 pounds (3 kg) of flammable, toxic or highly toxic refrigerant or ammonia shall be provided with an emergency pressure control system in accordance with Section 605.10 of the *International Fire Code.*

SECTION 1106
MACHINERY ROOM, SPECIAL REQUIREMENTS

1106.1 General. Where required by Section 1104.2, the *machinery room* shall meet the requirements of this section in addition to the requirements of Section 1105.

1106.2 Elevated temperature. There shall not be an open flame-producing device or continuously operating hot surface over 800°F (427°C) permanently installed in the room.

[S] 1106.3 Ammonia room ventilation. Ventilation systems in ammonia machinery rooms shall be operated continuously at the ventilation rate specified in Section 1105.6.3.

Exceptions:

1. Machinery rooms equipped with a vapor detector that will automatically start the ventilation system at the ventilation rate specified in Section 1105.6.3, and that will actuate an alarm at a detection level not to exceed 1,000 ppm.
2. Machinery rooms conforming to the Class 1, Division 2, *hazardous location* classification requirements of ((~~NFPA 70~~)) the *Seattle Electrical Code* are permitted to be ventilated in accordance with Section 1105.

1106.4 Flammable refrigerants. Where refrigerants of Groups A2, A3, B2 and B3 are used, the *machinery room* shall conform to the Class 1, Division 2, *hazardous location* classification requirements of NFPA 70.

Exceptions:

1. Ammonia *machinery rooms* that are provided with *ventilation* in accordance with Section 1106.3.
2. *Machinery rooms* for systems containing Group A2L *refrigerants* that are in accordance with Section 1106.5.

1106.5 Special requirements for Group A2L refrigerant machinery rooms. *Machinery rooms* for systems containing Group A2L *refrigerants* shall comply with Sections 1106.5.1 through 1106.5.3.

Exception: *Machinery rooms* conforming to the Class I, Division 2, hazardous location classification requirements of NFPA 70 are not required to comply with Sections 1106.5.1 and 1106.5.2.

[F] 1106.5.1 Refrigerant detection system. The *machinery room* shall be provided with a *refrigerant* detection system. The *refrigerant* detection system shall be in accordance with Section 605.8 of the *International Fire Code* and all of the following:

1. The detectors shall activate at or below a *refrigerant* concentration of 25% of the *LFL*.
2. Upon activation, the detection system shall activate the emergency ventilation system required by Section 1106.5.2.
3. The detection, signaling and control circuits shall be supervised.

1106.5.2 Emergency ventilation system. An emergency ventilation system shall be provided at the minimum exhaust rate specified in ASHRAE 15 or Table 1106.5.2. Shutdown of the emergency ventilation system shall be by manual means.

TABLE 1106.5.2
MINIMUM EXHAUST RATES

REFRIGERANT	Q(m/sec)	Q(cfm)
R32	15.4	32,600
R143	13.6	28,700
R444A	6.46	13,700
R444B	10.6	22,400
R445A	7.83	16,600
R446A	23.9	50,700
R447A	23.8	50,400
R451A	7.04	15,000
R451B	7.05	15,000
R1234yf	7.80	16,600
R1234ze(E)	5.92	12,600

1106.5.3 Emergency ventilation system discharge. The emergency ventilation system point of discharge to the atmosphere shall be located outside of the structure at not less than 15 feet (4572 mm) above the adjoining grade level and not less than 20 feet (6096 mm) from any window, *ventilation* opening or *exit.*

[F] 1106.6 Remote controls. Remote control of the mechanical equipment and appliances located in the machinery room shall comply with Sections 1106.6.1 and 1106.6.2.

[F] 1106.6.1 Refrigeration system emergency shutoff. A clearly identified switch of the break-glass type or with an approved tamper-resistant cover shall provide off-only control of refrigerant compressors, refrigerant pumps, and normally closed, automatic refrigerant valves located in the machinery room. Additionally, this equipment shall be automatically shut off whenever the refrigerant vapor concentration in the machinery room exceeds the vapor detector's upper detection limit or 25 percent of the LEL, whichever is lower.

[F] 1106.6.2 Ventilation system. A clearly identified switch of the break-glass type or with an approved tamper-resistant cover shall provide on-only control of the *machinery room* ventilation fans.

[F] 1106.7 Emergency signs and labels. Refrigeration units and systems shall be provided with *approved* emergency signs, charts, and labels in accordance with the *International Fire Code*.

[S][F] 1106.8 Alarm activation. Where continuous ventilation is provided, failure of the ventilation system shall automatically activate an audible and visual alarm.

SECTION 1107
REFRIGERANT PIPING

1107.1 General. The design of refrigerant piping shall be in accordance with ASME B31.5. Refrigerant piping shall be installed, tested and placed in operation in accordance with this chapter.

1107.2 Piping location. Refrigerant piping that crosses an open space that affords passageway in any building shall be not less than 7 feet 3 inches (2210 mm) above the floor unless the piping is located against the ceiling of such space. Refrigerant piping shall not be placed in any of the following:

1. A fire-resistance-rated exit access corridor.
2. An interior exit stairway.

3. An interior exit ramp.
4. An exit passageway.
5. An elevator, dumbwaiter or other shaft containing a moving object.
6. A shaft that has one or more openings into a fire-resistance-rated exit access corridor, interior exit stairway or ramp or exit passageway.

[S] Exceptions:

1. Refrigerant piping and equipment is permitted to be separated from the corridor, stair, passageway by construction equal to the rated construction of the space and located so that all required clearances are maintained.
2. Refrigerant piping is permitted to pass through corridors if located above a ceiling and the piping has no joints in the corridor.
3. Refrigerant piping is permitted to pass through lobbies that are part of an exit system if the refrigeration system contains not more that the amount of refrigerant allowed by Section 1104.3.

1107.2.1 Piping in concrete floors. Refrigerant piping installed in concrete floors shall be encased in pipe ducts. The piping shall be isolated and supported to prevent damaging vibration, stress and corrosion.

1107.2.2 Refrigerant penetrations. Refrigerant piping shall not penetrate floors, ceilings or roofs.

Exceptions:

1. Penetrations connecting the basement and the first floor.
2. Penetrations connecting the top floor and a machinery penthouse or roof installation.
3. Penetrations connecting adjacent floors served by the refrigeration system.
4. Penetrations by piping in a direct system where the refrigerant quantity does not exceed Table 1103.1 for the smallest occupied space through which the piping passes.
5. In other than industrial occupancies and where the refrigerant quantity exceeds Table 1103.1 for the smallest space, penetrations for piping that connects separate pieces of *equipment* that are either:
   - 5.1. Enclosed by an *approved* gas-tight, fire-resistive duct or shaft with openings to those floors served by the refrigeration system.
   - 5.2. Located on the exterior of the building where vented to the outdoors or to the space served by the system and not used as an air shaft, closed court or similar space.

1107.3 Pipe enclosures. Rigid or flexible metal enclosures or pipe ducts shall be provided for soft, annealed copper tubing and used for refrigerant piping erected on the premises and containing other than Group A1 or B1 refrigerants. Enclosures shall not be required for connections between condensing units and the nearest riser box(es), provided such connections do not exceed 6 feet (1829 mm) in length.

1107.4 Condensation. Refrigerating piping and fittings, brine piping and fittings that, during normal operation, will reach a surface temperature below the dew point of the surrounding air, and are located in spaces or areas where condensation will cause a safety hazard to the building occupants, structure, electrical *equipment* or any other *equipment* or appliances, shall be protected in an *approved* manner to prevent such damage.

1107.5 Materials for refrigerant pipe and tubing. Piping materials shall be as set forth in Sections 1107.5.1 through 1107.5.5.

[S] 1107.5.1 Steel pipe. Carbon steel pipe with a wall thickness not less than Schedule 80 shall be used for Group A2, A3, B2 or B3 refrigerant liquid lines for sizes 1.5 inches (38 mm) and smaller. Carbon steel pipe with a wall thickness not less than Schedule 40 shall be used for Group A1 or B1 refrigerant liquid lines 6 inches (152 mm) and smaller, Group A2, A3, B2 or B3 refrigerant liquid lines sizes 2 inches (51 mm) through 6 inches (152 mm) and all refrigerant suction and discharge lines 6 inches (152 mm) and smaller. ((~~Type F steel pipe shall not be used for refrigerant~~)) Refrigerant lines having an operating temperature less than -20°F (-29°C) shall be designed to meet the requirements of ASME B31.5, *Refrigeration Piping and Heat Transfer Components*.

1107.5.2 Copper and copper-alloy pipe. Standard iron-pipe size, copper and copper-alloy (not less than 80-percent copper) pipe shall conform to ASTM B42 and ASTM B43.

1107.5.3 Copper tube. Copper tube used for refrigerant piping erected on the premises shall be seamless copper tube of Type ACR (hard or annealed) complying with ASTM B280 or ASTM B819. Annealed temper copper tube shall not be used in sizes larger than a 2-inch (51 mm) nominal size. Mechanical joints other than press-connect joints listed for refrigerant piping shall not be used on annealed temper copper tube in sizes larger than 7/8-inch (22.2 mm) OD size.

1107.5.4 Copper tubing joints. Copper tubing joints used in refrigerating systems containing Group A2, A3, B2 or B3 refrigerants shall be brazed. Soldered joints shall not be used in such refrigerating systems.

1107.5.5 Aluminum tube. Type 3003-0 aluminum tubing with high-pressure fittings shall not be used with methyl chloride and other refrigerants known to attack aluminum.

1107.6 Joints and refrigerant-containing parts in air ducts. Joints and all refrigerant-containing parts of a refrigerating system located in an air duct of an air-conditioning system carrying conditioned air to and from human-occupied space shall be constructed to withstand, without leakage, a pressure of 150 percent of the higher of the design pressure or pressure relief device setting.

1107.7 Exposure of refrigerant pipe joints. Refrigerant pipe joints erected on the premises shall be exposed for visual inspection prior to being covered or enclosed.

1107.8 Stop valves. Systems containing more than 6.6 pounds (3 kg) of a refrigerant in systems using positive-displacement compressors shall have stop valves installed as follows:

1. At the inlet of each compressor, compressor unit or condensing unit.
2. At the discharge outlet of each compressor, compressor unit or condensing unit and of each liquid receiver.

Exceptions:

1. Systems that have a refrigerant pumpout function capable of storing the entire refrigerant charge in a receiver or heat exchanger.
2. Systems that are equipped with provisions for pumpout of the refrigerant using either portable or permanently installed recovery *equipment*.
3. Self-contained systems.

[S] 1107.8.1 Liquid receivers. Systems containing 100 pounds (45 kg) or more of a refrigerant, other than systems utilizing nonpositive displacement compressors, shall have stop valves, in addition to those required by Section 1107.8, on each inlet of each liquid receiver. Stop valves shall not be required on the inlet of a receiver in a condensing unit, nor on the inlet of a receiver that is an integral part of the condenser.

Ammonia systems shall be provided with liquid receivers designed for pumpdown that have sufficient capacity to assure that the liquid does not occupy more than 90 percent of the volume of the receiver at 90ºF.

1107.8.2 Copper tubing. Stop valves used with soft annealed copper tubing or hard-drawn copper tubing 7/8-inch (22.2 mm) OD standard size or smaller shall be securely mounted, independent of tubing fastenings or supports.

1107.8.3 Identification. Stop valves shall be identified where their intended purpose is not obvious. Numbers shall not be used to label the valves, unless a key to the numbers is located near the valves.

SECTION 1108
FIELD TEST

1108.1 General. Every refrigerant-containing part of every system that is erected on the premises, except compressors, condensers, vessels, evaporators, safety devices, pressure gauges and control mechanisms that are *listed* and factory tested, shall be tested and proved tight after complete installation, and before operation. Tests shall include both the high- and low-pressure sides of each system at not less than the lower of the design pressures or the setting of the pressure relief device(s). The design pressures for testing shall be those listed on the condensing unit, compressor or compressor unit nameplate, as required by ASHRAE 15.

Exceptions:

1. Gas bulk storage tanks that are not permanently connected to a refrigeration system.
2. Systems erected on the premises with copper tubing not exceeding 5/8-inch (15.8 mm) OD, with wall thickness as required by ASHRAE 15, shall be tested in accordance with Section 1108.1, or by means of refrigerant charged into the system at the saturated vapor pressure of the refrigerant at 70°F (21°C) or higher.
3. Limited-charge systems equipped with a pressure relief device, erected on the premises, shall be tested at a pressure not less than one and one-half times the pressure setting of the relief device. If the *equipment* or *appliance* has been tested by the manufacturer at one and one-half times the design pressure, the test after erection on the premises shall be conducted at the design pressure.

1108.1.1 Booster compressor. Where a compressor is used as a booster to obtain an intermediate pressure and discharges into the suction side of another compressor, the booster compressor shall be considered to be a part of the low side, provided that it is protected by a pressure relief device.

1108.1.2 Centrifugal/nonpositive displacement compressors. In field-testing systems using centrifugal or other nonpositive displacement compressors, the entire system shall be considered as the low-side pressure for field test purposes.

1108.2 Test gases. Tests shall be performed with an inert dried gas including, but not limited to, nitrogen and carbon dioxide. Oxygen, air, combustible gases and mixtures containing such gases shall not be used.

Exception: The use of air is allowed to test R-717, ammonia, systems provided that they are subsequently evacuated before charging with refrigerant.

CHAPTER 12

HYDRONIC PIPING

User note:

About this chapter: *Chapter 12 addresses the piping systems used in heating and cooling systems. Such piping typically conveys water, water and antifreeze solutions, steam and condensate. The fluids conveyed are heated or cooled by boilers, chillers, and heat pumps, which are all components of HVAC systems.*

SECTION 1201
GENERAL

[S] 1201.1 Scope. The provisions of this chapter shall govern the construction, installation, *alteration* and repair of hydronic piping systems. This chapter shall apply to hydronic piping systems that are part of heating, ventilation and air-conditioning systems. Such piping systems shall include steam, hot water, chilled water, steam condensate and ground source heat pump loop systems. Potable cold and hot water distribution systems shall be installed in accordance with the ((~~*International*~~)) *Uniform Plumbing Code*.

1201.2 Sizing. Piping and piping system components for hydronic systems shall be sized for the demand of the system.

1201.3 Standards. As an alternative to the provisions of Sections 1202 and 1203, piping shall be designed, installed, inspected and tested in accordance with ASME B31.9.

SECTION 1202
MATERIAL

1202.1 Piping. Piping material shall conform to the standards cited in this section.

Exception: Embedded piping regulated by Section 1209.

1202.2 Used materials. Reused pipe, fittings, valves or other materials shall be clean and free of foreign materials and shall be *approved* by the code official for reuse.

1202.3 Material rating. Materials shall be rated for the operating temperature and pressure of the hydronic system. Materials shall be suitable for the type of fluid in the hydronic system.

1202.4 Piping materials standards. Hydronic pipe shall conform to the standards listed in Table 1202.4. The exterior of the pipe shall be protected from corrosion and degradation.

TABLE 1202.4
HYDRONIC PIPE

MATERIAL	STANDARD (see Chapter 15)
Acrylonitrile butadiene styrene (ABS) plastic pipe	ASTM D1527; ASTM F2806
Chlorinated polyvinyl chloride (CPVC) plastic pipe	ASTM D2846; ASTM F441; ASTM F442
Copper or copper-alloy pipe	ASTM B42; ASTM B43; ASTM B302
Copper or copper-alloy tube (Type K, L or M)	ASTM B75; ASTM B88; ASTM B135; ASTM B251
Cross-linked polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX) pressure pipe	ASTM F1281; CSA CAN/CSA-B-137.10
Cross-linked polyethylene (PEX) tubing	ASTM F876
Ductile iron pipe	AWWA C115/A21.15; AWWA C151/A21.51
Lead pipe	FS WW-P-325B
Polyethylene/aluminum/polyethylene (PE-AL-PE) pressure pipe	ASTM F1282; CSA B137.9
Polypropylene (PP) plastic pipe	ASTM F2389
Polyvinyl chloride (PVC) plastic pipe	ASTM D1785; ASTM D2241
Raised temperature polyethylene (PE-RT)	ASTM F2623; ASTM F2769; CSA B137.18
Steel pipe	ASTM A53; ASTM A106
Steel tubing	ASTM A254

1205.1.6 Expansion tanks. Shutoff valves shall be installed at connections to nondiaphragm-type expansion tanks.

1205.2 Reduced pressure. A pressure relief valve shall be installed on the low-pressure side of a hydronic piping system that has been reduced in pressure. The relief valve shall be set at the maximum pressure of the system design. The valve shall be installed in accordance with Section 1006.

SECTION 1206
PIPING INSTALLATION

1206.1 General. Piping, valves, fittings and connections shall be installed in accordance with the conditions of approval.

[S] 1206.2 System drain down. Hydronic piping systems shall be designed and installed to permit the system to be drained. Where the system drains to the plumbing drainage system, the installation shall conform to the requirements of the ((~~*International*~~)) *Uniform Plumbing Code*.

Exception: The buried portions of systems embedded underground or under floors.

[S] 1206.3 Protection of potable water. The potable water system shall be protected from backflow in accordance with the ((~~*International*~~)) *Uniform Plumbing Code*.

1206.4 Pipe penetrations. Openings for pipe penetrations in walls, floors or ceilings shall be larger than the penetrating pipe. Openings through concrete or masonry building elements shall be sleeved. The annular space surrounding pipe penetrations shall be protected in accordance with the *International Building Code*.

1206.5 Clearance to combustibles. A pipe in a hydronic piping system in which the exterior temperature exceeds 250°F (121°C) shall have a minimum *clearance* of 1 inch (25 mm) to combustible materials.

1206.6 Contact with building material. A hydronic piping system shall not be in direct contact with building materials that cause the piping material to degrade or corrode, or that interfere with the operation of the system.

1206.7 Water hammer. The flow velocity of the hydronic piping system shall be controlled to reduce the possibility of water hammer. Where a quick-closing valve creates water hammer, an *approved* water-hammer arrestor shall be installed. The arrestor shall be located within a range as specified by the manufacturer of the quick-closing valve.

1206.8 Steam piping pitch. Steam piping shall be installed to drain to the boiler or the steam trap. Steam systems shall not have drip pockets that reduce the capacity of the steam piping.

1206.9 Strains and stresses. Piping shall be installed so as to prevent detrimental strains and stresses in the pipe. Provisions shall be made to protect piping from damage resulting from expansion, contraction and structural settlement. Piping shall be installed so as to avoid structural stresses or strains within building components.

1206.9.1 Flood hazard. Piping located in a flood hazard area shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the *design flood elevation*.

1206.10 Pipe support. Pipe shall be supported in accordance with Section 305.

1206.11 Condensation. Provisions shall be made to prevent the formation of condensation on the exterior of piping.

SECTION 1207
TRANSFER FLUID

1207.1 Flash point. The flash point of transfer fluid in a hydronic piping system shall be not less than 50°F (28°C) above the maximum system operating temperature.

1207.2 Makeup water. The transfer fluid shall be compatible with the makeup water supplied to the system.

SECTION 1208
TESTS

1208.1 General. Hydronic piping systems shall be tested hydrostatically at one and one-half times the maximum system design pressure, but not less than 100 psi (689 kPa). The duration of each test shall be not less than 15 minutes.

Exception: For PEX piping systems, testing with a compressed gas shall be an alternative to hydrostatic testing where compressed air or other gas pressure testing is specifically authorized by all of the manufacturers' instructions for the PEX pipe and fitting products installed at the time the system is being tested, and compressed air or other gas testing is not otherwise prohibited by applicable codes, laws or regulations outside of this code.

SECTION 1209
EMBEDDED PIPING

1209.1 Materials. Piping for heating panels shall be standard-weight steel pipe, Type L copper tubing, polybutylene or other *approved* plastic pipe or tubing rated at 100 psi (689 kPa) at 180°F (82°C).

1209.2 Pressurizing during installation. Piping to be embedded in concrete shall be pressure tested prior to pouring concrete. During pouring, the pipe shall be maintained at the proposed operating pressure.

1209.3 Embedded joints. Joints of pipe or tubing that are embedded in a portion of the building, such as concrete or plaster, shall be in accordance with the requirements of Sections 1209.3.1 through 1209.3.5.

1209.3.1 Steel pipe joints. Steel pipe shall be welded by electrical arc or oxygen/acetylene method.

1209.3.2 Copper tubing joints. Copper tubing shall be joined by brazing complying with Section 1203.3.1.

1209.3.3 Polybutylene joints. Polybutylene pipe and tubing shall be installed in continuous lengths or shall be joined by heat fusion in accordance with Section 1203.8.1.

1209.3.4 Polyethylene of raised temperature (PE-RT) joints. PE-RT tubing shall be installed in continuous lengths or shall be joined by hydronic fittings listed in Table 1202.5.

1209.3.5 Cross-linked polyethylene (PEX) joints. PEX tubing shall be installed in continuous lengths or shall be joined by hydronic fittings listed in Table 1202.5.

1209.4 Not embedded related piping. Joints of other piping in cavities or running exposed shall be joined by *approved* methods in accordance with manufacturer's installation instructions and related sections of this code.

[W][S] 1209.5 Thermal barrier required. Radiant floor heating and snow melt systems shall be provided with a thermal barrier in accordance with Sections 1209.5.1 and 1209.5.2. ((~~Insulation *R*-values for~~)) Concrete slab-on-grade, ((~~and suspended floor installation shall be in accordance with the *International Energy Conservation Code*~~)) asphalt and paver-system type pavements shall have a minimum of R-10 insulation installed under the area to be snow melted. The insulation shall be located underneath the snow and ice melt hydronic piping or cable and along all edges of the pavement where the snow and ice melt system is installed in accordance with the snow and ice melt manufacturer's instructions.

((~~**Exception:** Insulation shall not be required in engineered systems where it can be demonstrated that the insulation will decrease the efficiency or have a negative effect on the installation.~~))

1209.5.1 ((~~Thermal break required~~)) Slab-on-grade insulation. ((~~A thermal break shall be provided consisting of asphalt expansion joint materials or similar insulating materials at a point where a heated slab meets a foundation wall or other conductive slab.~~)) Radiant piping utilized in slab-on-grade applications shall be provided with insulating materials installed beneath the piping as required by the Washington State Energy Code.

1209.5.2 Thermal barrier material marking. Insulating materials utilized in thermal barriers shall be installed such that the manufacturer's *R*-value mark is readily observable upon inspection.

SECTION 1210
PLASTIC PIPE GROUND-SOURCE HEAT PUMP LOOP SYSTEMS

1210.1 Ground-source heat pump-loop water piping. Ground-source heat pump ground-loop piping and tubing material for water-based systems shall conform to the standards cited in this section.

1210.2 Used materials. Reused pipe, fittings, valves, and other materials shall not be permitted in ground-source heat pump loop systems.

1210.3 Material rating. Pipe and tubing shall be rated for the operating temperature and pressure of the ground-source heat pump loop system. Fittings shall be suitable for the pressure applications and recommended by the manufacturer for installation with the pipe and tubing material installed. Where used underground, materials shall be suitable for burial.

1210.4 Piping and tubing materials standards. Ground-source heat pump ground-loop pipe and tubing shall conform to the standards listed in Table 1210.4.

TABLE 1210.4
GROUND-SOURCE LOOP PIPE

MATERIAL	STANDARD (see Chapter 15)
Chlorinated polyvinyl chloride (CPVC)	ASTM D2846; ASTM F441; ASTM F442
Cross-linked polyethylene (PEX)	ASTM F876; CSA B137.5
Polyethylene/aluminum/polyethylene (PE-AL-PE) pressure pipe	ASTM F1282; CSA B137.9
High-density polyethylene (HDPE)	ASTM D2737; ASTM D3035; ASTM F714; AWWA C901; CSA B137.1; CSA C448; NSF 358-1
Polypropylene (PP-R)	ASTM F2389; CSA B137.11; NSF 358-2

clean and free from moisture. The joint shall be undisturbed until cool. Joints shall be made in accordance with ASTM F2389.

1210.6.7.2 Mechanical and compression sleeve joints. Mechanical and compression sleeve joints shall be installed in accordance with the manufacturer's instructions.

1210.6.8 Raised temperature polyethylene (PE-RT) plastic tubing. Joints between raised temperature polyethylene tubing and fittings shall comply with Sections 1210.6.8.1 and 1210.6.8.2. Mechanical joints shall comply with Section 1210.6.3.

1210.6.8.1 Compression-type fittings. Where compression-type fittings include inserts and ferrules or O-rings, the fittings shall be installed without omitting the inserts and ferrules or O-rings.

1210.6.8.2 PE-RT-to-metal connections. Solder joints in a metal pipe shall not occur within 18 inches (457 mm) of a transition from such metal pipe to PE-RT pipe.

1210.6.9 PVC plastic pipe. Joints between PVC plastic pipe and fittings shall be solvent-cemented or threaded joints comply with Section 1203.3.

1210.7 Shutoff valves. Shutoff valves shall be installed in ground-source loop piping systems in the locations indicated in Sections 1210.7.1 through 1210.7.7.

1210.7.1 Heat exchangers. Shutoff valves shall be installed on the supply and return side of a heat exchanger.

Exception: Shutoff valves shall not be required where heat exchangers are integral with a boiler or are a component of a manufacturer's boiler and heat exchanger packaged unit and are capable of being isolated from the hydronic system by the supply and return valves re-quired by Section 1005.1.

1210.7.2 Central systems. Shutoff valves shall be installed on the building supply and return of a central utility system.

1210.7.3 Pressure vessels. Shutoff valves shall be installed on the connection to any pressure vessel.

1210.7.4 Pressure-reducing valves. Shutoff valves shall be installed on both sides of a pressure-reducing valve.

1210.7.5 Equipment and appliances. Shutoff valves shall be installed on connections to mechanical *equipment* and appliances. This requirement does not apply to components of a ground-source loop system such as pumps, air separators, metering devices, and similar *equipment*.

[S] 1210.7.6 Expansion tanks. Shutoff valves shall be installed at connections to ((~~nondiaphragm-type~~)) expansion tanks. A method of draining the expansion tank downstream of the shutoff valve shall be provided.

1210.7.7 Reduced pressure. A pressure relief valve shall be installed on the low-pressure side of a hydronic piping system that has been reduced in pressure. The relief valve shall be set at the maximum pressure of the system design. The valve shall be installed in accordance with Section 1006.

1210.8 Installation. Piping, valves, fittings, and connections shall be installed in accordance with the conditions of approval.

1210.8.1 Protection of potable water. Where ground-source heat pump ground-loop systems have a connection to a potable water supply, the potable water system shall be protected from backflow in accordance with the *International Plumbing Code*.

1210.8.2 Pipe penetrations. Openings for pipe penetrations in walls, floors and ceilings shall be larger than the penetrating pipe. Openings through concrete or masonry building elements shall be sleeved. The annular space surrounding pipe penetrations shall be protected in accordance with the *International Building Code*.

1210.8.3 Clearance from combustibles. A pipe in a ground-source heat pump piping system having an exterior surface temperature exceeding 250°F (121°C) shall have a minimum *clearance* of 1 inch (25 mm) from combustible materials.

1210.8.4 Contact with building material. A ground-source heat pump ground-loop piping system shall not be in direct contact with building materials that cause the piping or fitting material to degrade or corrode, or that interfere with the operation of the system.

1210.8.5 Strains and stresses. Piping shall be installed so as to prevent detrimental strains and stresses in the pipe. Provisions shall be made to protect piping from damage resulting from expansion, contraction and structural settlement. Piping shall be installed so as to avoid structural stresses or strains within building components.

1210.8.6 Flood hazard. Piping located in a flood hazard area shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the *design flood elevation*.

1210.8.7 Pipe support. Pipe shall be supported in accordance with Section 305.

1210.8.8 Velocities. Ground-source heat pump ground-loop systems shall be designed so that the flow velocities do not exceed the maximum flow velocity recommended by the pipe and fittings manufacturer and shall be controlled to reduce the possibility of water hammer.

CHAPTER 14

SOLAR THERMAL SYSTEMS

User note:

About this chapter: *Chapter 14 addresses solar thermal systems, not photovoltaic systems. The provisions are intended to protect property and life from the hazards associated with high-temperature liquids, pressurized systems and toxic fluids. There are also provisions to protect the building structure and the solar thermal system components from damage.*

SECTION 1401
GENERAL

[S] 1401.1 Scope. This chapter shall govern the design, construction, installation, *alteration* and repair of solar thermal systems, *equipment* and appliances intended to utilize solar energy for space heating or cooling, domestic hot water heating, swimming pool heating or process heating. Photovoltaic solar systems shall be installed in accordance with the *International Building Code* and Article 690 of the *Seattle Electrical Code.* Systems interconnected to the electric grid shall comply with additional requirements of Seattle City Light.

Note: See the *Seattle Boiler and Pressure Vessel Code* for regulations applicable to boilers and pressure vessels, and the *Uniform Plumbing Code* for regulations applicable to water heaters.

[S] 1401.2 Potable water supply. Potable water supplies to solar systems shall be protected against contamination in accordance with the ((~~*International*~~)) *Uniform Plumbing Code*.

Exception: Where all solar system piping is a part of the potable water distribution system, in accordance with the requirements of the ((~~*International*~~)) *Uniform Plumbing Code*, and all components of the piping system are *listed* for potable water use, cross-connection protection measures shall not be required.

1401.3 Heat exchangers. Heat exchangers used in domestic water-heating systems shall be *approved* for the intended use. The system shall have adequate protection to ensure that the potability of the water supply and distribution system is properly safeguarded.

1401.4 Solar thermal equipment and appliances. Solar thermal *equipment* and appliances shall conform to the requirements of this chapter and ICC 900/SRCC 300. Solar thermal systems shall be listed and labeled in accordance with ICC 900/SRCC 300 and shall be installed in accordance with the manufacturer's instructions and ICC 900/SRCC 300.

1401.4.1 Collectors and panels. Solar thermal collectors and panels shall be listed and labeled in accordance with ICC 901/SRCC 100.

SECTION 1402
DESIGN AND INSTALLATION

1402.1 General. The design and installation of solar thermal systems shall comply with Sections 1402.1 through 1402.8. Solar thermal systems shall be listed and labeled in accordance with ICC 900/SRCC 300 and shall be installed in accordance with the manufacturer's instructions and ICC 900/SRCC 300.

1402.2 Access. Access shall be provided to solar thermal equipment for maintenance. Solar thermal systems and appurtenances shall not obstruct or interfere with the operation of any doors, windows or other building components requiring operation or access. Roof-mounted solar thermal equipment shall not obstruct or interfere with the operation of roof-mounted equipment, appliances, chimneys, roof hatches, smoke vents, skylights and other roof penetrations and openings.

1402.3 Pressure and temperature. Solar thermal system components containing pressurized fluids shall be protected against pressures and temperatures exceeding design limitations with pressure and temperature relief valves or pressure relief valves. System components shall have a working pressure rating of not less than the setting of the pressure relief device.

[S] 1402.3.1 Relief device. Each section of the system in which excessive pressures are capable of developing shall have a relief device located so that a section cannot be valved off or otherwise isolated from a relief device. Relief valves shall comply with the requirements of ((~~Section 1006.6~~)) the *Seattle Boiler and Pressure Vessel Code*. For indirect solar systems, pressure relief valves in solar loops shall also comply with ICC 900/SRCC 300.

1402.3.2 Vacuum. System components that might be subjected to a vacuum while in operation or during shutdown shall be designed to withstand such vacuum or shall be protected with vacuum relief valves.

1402.4 Protection from freezing. System components shall be protected from damage by freezing of heat transfer liquids at the lowest ambient temperatures that will be encountered during the operation of the system. Freeze protection shall be provided in accordance with ICC 900/SRCC 300. Drain-back systems shall be installed in compliance with Section 1402.4.1 and systems utilizing freeze-protection valves shall comply with Section 1402.4.2.

1402.4.1 Drain-back systems. Drain-back systems shall be designed and installed to allow for manual gravity draining of fluids from areas subject to freezing to locations not subject to freezing, and air filling of the components and piping. Such piping and components shall maintain a horizontal slope in the direction of flow of not less than one-fourth unit vertical in 12 units horizontal (2-percent slope). Piping and components subject to manual gravity draining shall permit subsequent air filling upon drainage and air storage or venting upon refilling.

1402.4.2 Freeze-protection valves. Freeze-protection valves shall discharge in a manner that does not create a hazard or structural damage.

1402.5 Protection of potable water. Where a solar thermal system heats potable water to supply a potable hot water distribution or any other type of heating system, the solar thermal system shall be in accordance with Sections 1402.5.1 through 1402.5.3 as applicable.

1402.5.1 Indirect systems. Water supplies of any type shall not be connected to the solar heating loop of an indirect solar thermal hot water heating system. This requirement shall not prohibit the presence of inlets or outlets on the solar heating loop for the purposes of servicing the fluid in the solar heating loop.

1402.5.2 Direct systems for potable water distribution systems. Where a solar thermal system directly heats potable water for a potable water distribution system, the pipe, fittings, valves and other components that are in contact with the potable water in the system shall comply with the requirements of the *International Plumbing Code*.

1402.5.3 Direct systems for other than potable water distribution systems. Where a solar thermal system directly heats water for a system other than a potable water distribution system, a potable water supply connected to such system shall be protected against backflow in accordance with the *International Plumbing Code.*

1402.6 Protection of equipment. Solar thermal *equipment* exposed to vehicular traffic shall be installed not less than 6 feet (1829 mm) above the finished floor.

Exception: This section shall not apply where the *equipment* is protected from motor vehicle impact.

1402.7 Protection of structure. In the process of installing or repairing any part of a solar thermal system, the building or structure shall be left in a safe structural condition in accordance with Sections 302, 1402.7.1 and 1402.7.2.

1402.7.1 Controlling condensation. Where attics or structural spaces are part of a passive solar system, ventilation of such spaces, as required by Section 406, is not required where other *approved* means of controlling condensation are provided.

1402.7.2 Penetrations. Roof and wall penetrations shall be flashed and sealed to prevent entry of water, rodents and insects in accordance with Section 302.

1402.8 Equipment. The solar thermal system shall be equipped in accordance with the requirements of Sections 1402.8.1 through 1402.8.5.3.

1402.8.1 Collectors and panels. Solar collectors and panels shall comply with Sections 1402.8.1.1 through 1402.8.1.4.

1402.8.1.1 Design. Solar thermal collectors and panels shall be listed and labeled in accordance with ICC 901/SRCC 100.

[W] 1402.8.1.2 Rooftop-mounted solar thermal collectors and systems. The roof shall be constructed to support the loads imposed by roof-mounted solar collectors. Where mounted on or above the roof covering, the collector array ((~~and supporting construction~~)) shall be constructed of noncombustible materials or fire-retardant-treated wood conforming to the *International Building Code* to the extent required for the type of roof construction of the building to which the collectors are accessory.

1402.8.1.3 Collectors as roof covering. Roof-mounted solar collectors that also serve as a roof covering shall conform to the requirements for roof coverings in accordance with the *International Building Code*.

Exception: The use of plastic solar collector covers shall be limited to those *approved* light-transmitting plastics meeting the requirements for plastic roof panels in Section 2609 of the *International Building Code*.

1402.8.1.4 Collector sensors. Collector sensor installation, sensor location and the protection of exposed sensor wires from degradation shall be in accordance with ICC 900/SRCC 300, NFPA 70 and the collector manufacturer's instructions.

1402.8.2 Ducts. Ducts utilized in solar heating and cooling systems shall be constructed and installed in accordance with Chapter 6.

1402.8.2.1 Filtering. Air transported to occupied spaces through dust-producing materials by means other than natural convection shall be filtered before entering the occupied space in accordance with Section 605.

[S] 1402.8.3 Piping. Potable piping shall be installed in accordance with the *International Plumbing Code*. Hydronic piping shall be installed in accordance with Chapter ((~~10~~)) 12 of this code. Mechanical system piping shall be supported in accordance with Section 305.

1402.8.3.1 Piping insulation. Piping shall be insulated in accordance with the requirements of the *International Energy Conservation Code*. Exterior insulation shall be protected from degradation. The entire solar loop shall be insulated. Where split-style insulation is used, the seam shall be sealed. Fittings shall be fully insulated. Insulation shall comply with Section 1204.1.

Exceptions:

1. Those portions of the piping that are used to help prevent the system from overheating shall not be required to be insulated.
2. Those portions of piping that are exposed to solar radiation, made of the same material as the solar collector absorber plate and covered in the same manner as the solar collector absorber, or that are used to collect additional solar energy, shall not be required to be insulated.
3. Piping in solar thermal systems using unglazed solar collectors to heat a swimming pool shall not be required to be insulated.

1402.8.4 Heat exchangers. Heat exchangers used in domestic water-heating systems shall be approved for the intended use. The system shall have adequate protection to ensure that the potability of the water supply and distribution system is properly safeguarded.

1402.8.4.1 Double-wall heat exchangers. Heat exchangers utilizing a non-food-grade fluid shall be separated from the potable water by double-wall construction. An air gap open to the atmosphere shall be provided between the two walls. The discharge location from the double-wall heat exchanger shall be visible.

1402.8.4.2 Single-wall heat exchangers. Food-grade fluids shall be used as the heat transfer fluid in single-wall heat exchangers.

1402.8.5 Water heaters and hot water storage tanks. Auxiliary water heaters, boilers and water storage tanks associated with solar thermal systems shall comply with Chapter 10 and ICC 900/SRCC 300.

1402.8.5.1 Hot water storage tank insulation. Hot water storage tanks shall be insulated and such insulation shall have an *R*-value of not less than R-12.5.

1402.8.5.2 Outdoor locations. Storage tanks and heating equipment installed in outdoor locations shall be designed for outdoor installation.

1402.8.5.3 Storage tank sensors. Storage tank sensors shall comply with ICC 900/SRCC 300.

1402.8.6 Solar loop. Solar loops shall be in accordance with Sections 1402.8.6.1 and 1402.8.6.2.

1402.8.6.1 Solar loop isolation. Valves shall be installed to allow the solar loop to be isolated from the remainder of the system.

1402.8.6.2 Drain and fill valve caps. Drain caps shall be installed on drain and fill valves.

[S] 1402.8.7 Expansion tanks. Liquid single-phase solar energy systems shall be equipped with expansion tanks sized in accordance with ((~~Section 1009~~)) the *Seattle Boiler and Pressure Vessel Code*, except that additional expansion tank acceptance volume equal to the total volume of liquid contained in the installed solar collectors and piping above the collectors shall be included.

SECTION 1403
HEAT TRANSFER FLUIDS

1403.1 Flash point. The flash point of the heat transfer fluid utilized in a solar system shall be not less than 50°F (28°C) above the design maximum nonoperating (no-flow) temperature of the fluid attained in the collector.

1403.2 Heat transfer fluids. Heat transfer gases and liquids shall be rated to withstand the system's maximum design temperature under operating conditions without degradation. Heat transfer fluids shall be in accordance with ICC 900/SRCC 300.

1403.3 Food-grade additives. Any food-grade fluid used as a heat transfer fluid containing additives shall be third-party listed by an approved agency to the appropriate section of the Code of Federal Regulations, Title 21, Food and Drugs, Chapter 1, Food and Drug Administration, Parts 174–186.

1403.4 Toxicity. The use of toxic fluids shall comply with Title 15 of the Federal Hazardous Substances Act and Chapter 60 of the *International Fire Code*.

1403.5 Flammable gases and liquids. A flammable liquid or gas shall not be utilized as a heat transfer fluid. The flash point of liquids used in occupancies classified in Group H or F shall not be lower unless *approved*.

CHAPTER 15

REFERENCED STANDARDS

User note:

About this chapter: *This code contains numerous references to standards that are used to provide requirements for materials and methods of construction. This chapter contains a comprehensive list of all standards that are referenced in this code. These standards, in essence, are part of this code to the extent of the reference to the standard.This chapter lists the standards that are referenced in various sections of this document.*

The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title, and the section or sections of this document that reference the standard. The application of the referenced standards shall be as specified in Section ((~~102.8~~)) 103.5.

ACCA

Air Conditioning Contractors of America
2800 Shirlington Road, Suite 300
Arlington, VA 22206

ANSI/ACCA 1 Manual D—2016: Residential Duct Systems
601.4, 603.2

ANSI/ASHRAE/ACCA 183—2007 (reaffirmed 2014): Peak Cooling and Heating Load Calculations in Buildings Except Low-rise Residential Buildings
312.1

AHRI

Air-Conditioning, Heating & Refrigeration Institute
2111 Wilson Blvd., Suite 500
Arlington, VA 22201

700—2015 with Addendum 1: Specifications for Refrigerants
1102.2.2.3

AMCA

Air Movement and Control Association International
30 West University Drive
Arlington Heights, IL 60004

230-15: Laboratory Methods of Testing Air Circulating Fans for Rating and Certification
929.1

550—09: Test Method for High Velocity Wind Driven Rain Resistant Louvers
401.5, 501.3.2

ANSI/AMCA 210–ANSI/ASHRAE 51—07: Laboratory Methods of Testing Fans for Aerodynamic Performance Rating
403.3.2.4

ANSI

American National Standards Institute
25 West 43rd Street, 4th Floor
New York, NY 10036

Z21.1—2010: Household Cooking Gas Appliances
505.2

Z21.8—1994 (R2002): Installation of Domestic Gas Conversion Burners
919.1

ASHRAE

ASHRAE
1791 Tullie Circle NE
Atlanta, GA 30329

ANSI/AMCA 210–ANSI/ASHRAE 51—07Laboratory Methods of Testing Fans for Aerodynamic Performance Rating
403.3.2.4

ASHRAE—2017: ASHRAE Fundamentals Handbook
603.2

15—2016: Safety Standard for Refrigeration Systems
1101.6, 1105.8, 1108.1

[W] 15-2019: Safety Standards for Refrigeration Systems and Designation and Classification of Refrigerants.

34—2016: Designation and Safety Classification of Refrigerants
202, 1102.2.1, 1103.1

62.1—2016: Ventilation for Acceptable Indoor Air Quality
403.3.1.1.2.3.2

[W] 62.2—2016: Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings
403.8.11

170—2017: Ventilation of Health Care Facilities
407

180—2012: Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems
102.3

ASME

American Society of Mechanical Engineers
Two Park Avenue
New York, NY 10016-5990

A112.4.1—2009: Water Heater Relief Valve Drain Tubes
1006.6

B1.20.1—2013: Pipe Threads, General Purpose (Inch)
1203.3.5, 1303.3.3

B16.3—2016: Malleable Iron Threaded Fittings, Classes 150 & 300
Table 1202.5

B16.5—2015: Pipe Flanges and Flanged Fittings NPS 1/2 through NPS 24
Table 1202.5

B16.9—2012: Factory Made Wrought Steel Buttwelding Fittings
Table 1202.5

B16.11—2016: Forged Fittings, Socket-welding and Threaded
Table 1202.5

B16.15—2013: Cast Alloy Threaded Fittings: Classes 125 and 250
Table 1202.5

B16.18—2012: Cast Copper Alloy Solder Joint Pressure Fittings
513.13.1, Table 1202.5

B16.22—2013: Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
513.13.1, Table 1202.5

B16.24—2016: Cast Copper Alloy Pipe Flanges and Flanged Fittings: Class 150, 300, 400, 600, 900, 1500 and 2500
Table 1202.5

B16.26—2016: Cast Copper Alloy Fittings for Flared Copper Tubes
Table 1202.5

B16.28—1994: Wrought Steel Buttwelding Short Radius Elbows and Returns
Table 1202.5

B16.51—2013: Copper and Copper Alloy Press-connect Pressure Fittings
Table 1202.5

B31.5—2016: Refrigeration Piping and Heat Transfer Components
1107.1

ASME—continued

B31.5—2010: Refrigeration Piping and Heat Transfer Components
1107.5.1

B31.9—2014: Building Services Piping
1201.3

BPVC—2015: ASME Boiler & Pressure Vessel Code–07 Edition
1009.2, 1003.1, 1004.1, 1011.1

CSD-1—2016: Controls and Safety Devices for Automatically Fired Boilers
1004.1

ASSE

American Society of Safety Engineers
520 N. Northwest Highway
Park Ridge, IL 60068

ANSI/ASSE Z359.1—2016: Requirements for ANSI/ASSE Z359 Fall Protection Code
304.11

ASSE

ASSE International
18927 Hickory Creek Drive, Suite 220
Mokena, IL 60448

1017—2010: Performance Requirements for Temperature Actuated Mixing Values for Hot Water Distribution Systems
1002.2.2

1061—2015: Performance Requirements for Push Fit Fittings
Table 1202.5

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428

A53/A53M—12: Specification for Pipe, Steel, Black and Hot-dipped, Zinc-coated, Welded and Seamless
Table 1202.4, Table 1202.5, Table 1302.3

A106/A106M—14: Specification for Seamless Carbon Steel Pipe for High-temperature Service
Table 1302.3, Table 1202.5, Table 1202.4 Table 1302.3

A126—04(2014): Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings
Table 1202.5

A234/A234M—15: Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
Table 1202.5

A254—12: Specification for Copper Brazed Steel Tubing
Table 1202.4, Table 1302.3

A395/A395M—99(2014): Standard Specification for Ferritic Ductile Iron Pressure-retaining Castings for Use at Elevated Temperatures
Table 1202.5, Table 1302.3

A420/A420M—14: Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-temperature Service
Table 1202.5

A536—84(2014): Standard Specification for Ductile Iron Castings
Table 1202.5

A539—99: Specification for Electric-resistance-welded Coiled Steel Tubing for Gas and Fuel Oil Lines
Table 1302.3

B32—08(2014): Specification for Solder Metal
1203.3.3

B42—15a: Specification for Seamless Copper Pipe, Standard Sizes
513.13.1, 1107.5.2, Table 1202.4, Table 1302.3

B43—15: Specification for Seamless Red Brass Pipe, Standard Sizes
513.13.1, 1107.5.2, Table 1202.4, Table 1302.3

DOL

U.S. Department of Labor
Occupational Safety and Health Administration
c/o Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402-9325

29 CFR Part 1910.1000 (2015). Air Contaminants
502.6

29 CFR Part 1910.1025 (2015): Toxic and Hazardous Substances
502.19

FDA

U.S. Food and Drug Administration
10903 New Hampshire Avenue
Silver Springs, MD 20993

FDA Title 15: Federal Hazardous Substances Act
1403.4

FDA Title 21: Code of Federal Regulations, Title 21, Food and Drugs, Chapter 1, Food and Drug Administration, Parts 174–186 (revised as of April 1, 2015)
1403.3

FS

Federal Specifications*
General Services Administration
7th & D Streets
Specification Section, Room 6039
Washington, DC 20407

WW-P-325B (1976): Pipe, Bends, Traps, Caps and Plugs; Lead (for Industrial Pressure and Soil and Waste Applications)
Table 1202.4
*Standards are available from the Supt. of Documents, U.S. Government Printing Office, Washington, DC 20402-9325

HVI

Home Ventilating Institute*
1740 Dell Range Blvd., Suite H
PMB 450
Cheyenne, WY 82009

[W] HVI 915-2015: Procedure for Loudness Testing of Residential Fan Products
403.4.6.1, 403.4.6.2, 403.4.7.2

[W] HVI 916-2015: Air Flow Test Procedure.
403.4.6.1, 403.4.6.2, 403.4.7.2

[W] HVI 920-2015: Product Performance Certification Procedure Including Verification and Challenge
403.4.6.1, 403.4.6.2, 403.4.7.2

ICC

International Code Council, Inc.
500 New Jersey Ave NW
6th Floor
Washington, DC 20001

IBC—18: International Building Code®
201.3, 202, 301.15, 301.16, 301.17, 301.18, 302.1, 302.2, 304.8, 304.11, 308.4.2.2, 308.4.2.4, 401.4, 401.5, 406.1, 501.3.1, 501.3.2, 501.10.2, 502.10, 502.10.1, 504.2, 504.10, 505.3, 506.3.3, 506.3.10, 506.3.12.2, 506.4.1, 509.1, 510.6, 510.6.3, 510.6.2, 510.7, 510.7.1.1, 510.7.2, 510.7.3, 510.8, 511.1.5, 513.1, 513.2, 513.3, 513.4.3, 513.5, 513.5.2, 513.5.2.1, 513.5.3, 513.5.3.2, 513.6.2, 513.10.5, 513.11.1, 513.12, 513.12.2, 513.20, 601.3, 602.2, 602.2.1.5.1, 602.2.1.5.2, 602.2.1.6.1, 602.2.1.6.2, 602.3, 602.4, 603.1, 603.10, 603.13, 603.18.2, 604.5.4, 607.1.1, 607.1.2, 607.3.2.1, 607.5.1, 607.5.2, 607.5.3, 607.5.4, 607.5.4.1, 607.5.5, 607.5.5.1, 607.5.6, 607.6, 607.6.1, 607.6.2, 607.6.2.1, 607.6.3, 701.2, 701.4.1, 701.4.2, 801.3, 801.16.1, 801.18.4, 801.18.4.1, 902.1, 908.3, 908.4, 910.3, 924.1, 925.1, 926.1, 927.2, 928.1, 1004.6, 1105.1, 1206.4, 1210.8.2, 1305.2.1, 1402.4, 1402.4.1

Introduction to this document

Seattle Municipal Code Section 22.502.016 adopts chapter 51-56 of the Washington Administrative Code (WAC) as the base language for the 2018 Seattle Plumbing Code. Chapter 51-56 WAC adopts the 2018 Uniform Plumbing Code and adds state-level amendments. This document contains Seattle-specific amendments to the WAC.

Seattle typically adopts its own Chapter 1 in place of WAC 51-56-0100; it is laid out in this document as an entirely new chapter, with no underline. Other WAC sections in chapter 51-56 are numbered based on the Uniform Plumbing Code chapter they contain/amend; 51-56-0200 addresses Chapter 2, 51-56-0300 addresses Chapter 3, and so on up to Chapter 51-56-1700 addressing Chapter 17. So each chapter's amendments in this document are amendments to the corresponding WAC section.

CHAPTER 1
ADMINISTRATION

SECTION 101 TITLE, SCOPE AND PURPOSE

101.1 Title. These regulations shall be known as the "Seattle Plumbing Code," may be cited as such, and are referred to herein as "this code." All references to the Uniform Plumbing Code contained in this code mean the Seattle Plumbing Code.

101.2 Scope. This code applies to the erection, installation, alteration, repair, relocation, replacement, addition to, use or maintenance of plumbing systems within the City. The design and testing of equipment regulated by this code are subject to the approval of the Authority Having Jurisdiction.

101.3 Purpose. The purpose of this code is to provide minimum standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation, and maintenance or use of plumbing systems within the City.

The purpose of this code is to provide for and promote the health, safety and welfare of the general public, and not to create or otherwise establish or designate any particular class or group of persons who will or should be especially protected or benefited by the terms of this code.

101.4 Applicability of city laws. A plumbing permit application shall be considered under applicable city law in effect on the date a valid and fully complete plumbing permit application is submitted or on a date as otherwise required by law.

101.4.1 Complete plumbing permit applications. A plumbing permit application is complete if the Authority Having Jurisdiction determines it meets the requirements of Sections 107.1.1 and 107.6 through 107.7.4.

Exception: If the Authority Having Jurisdiction allows a plumbing permit application to be submitted in phases for portions of the building, each phased portion submittal shall meet the requirements of Sections 107.1.1 and 107.6 through 107.7.4 applicable to the scope of the allowed phased portion, and the plumbing permit application shall be considered complete for the purpose of Section 101.4 on the date the phased portion submittal is submitted.

101.4.2 Permit conditions and denial. The Authority Having Jurisdiction may impose on a permit any conditions authorized by this code or other pertinent ordinances, regulations or laws. In addition, the Authority Having Jurisdiction may deny a permit if the Authority Having Jurisdiction determines that the proposed project or plumbing design documents do not conform to the requirements of this code, or other pertinent laws, ordinances or regulations.

101.5 Internal Consistency. If in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive governs. If there is a conflict between a general requirement and a specific requirement, the specific requirement governs.

101.6 Referenced Codes and Standards. The codes and standards referenced in this code are part of the requirements of this code to the extent prescribed by each such reference. If differences occur between provisions of this code and referenced codes and standards, the provisions of this code apply.

Exception: Where enforcement of a code provision would violate the conditions of the listing of the equipment or appliance, the conditions of the listing and manufacturer's instructions apply.

101.7 Appendices. Provisions in the Uniform Plumbing Code appendices do not apply except Appendices A, B and I which are specifically adopted.

101.8 Metric Units. Wherever in this code there is a conflict between metric units of measurement and U.S. customary units, the U.S. customary units govern.

101.9 References to Other Codes. Whenever an International, National or Uniform Code is referenced in this code, it means the Seattle edition of that code, including local amendments. References to the "Building Code," "Mechanical Code," "Fuel Gas Code," "Fire Code" and "Residential Code" mean the Seattle editions of those codes.

SECTION 102 ORGANIZATION AND DUTIES OF AUTHORITY HAVING JURISDICTION

102.1 Jurisdiction of Public Health—Seattle and King County. The Director of Public Health—Seattle and King County is the Authority Having Jurisdiction. The Director and the Director's authorized representative are authorized to administer and enforce this code; provided, that the Director of Seattle Public Utilities or his or her authorized representative shall administer and enforce provisions relating to the inspection and approval of water meters and, where applicable, building supply piping.

102.2 Designees. The Authority Having Jurisdiction may appoint such officers, inspectors, assistants and employees as are authorized from time to time. The Authority Having Jurisdiction may authorize such employees and other agents as may be necessary to carry out the functions of the Authority Having Jurisdiction.

102.3 Right of Entry. With the consent of the owner or occupier of a building or premises, or pursuant to a lawfully issued warrant, the Authority Having Jurisdiction may enter a building or premises at any reasonable time to perform the duties imposed by this code.

102.4 Modifications. The Authority Having Jurisdiction may modify the provisions of this code for individual cases if the Authority Having Jurisdiction finds: (1) there are practical difficulties involved in carrying out the provisions of this code; (2) the modification is in conformity with the intent and purpose of this code; and (3) the modification will provide a reasonable level of strength, effectiveness, fire resistance, durability, safety and sanitation when considered together with other safety features of the building or other relevant circumstances. The Authority Having Jurisdiction may, but is not required to, record the approval of modifications and any relevant information in the files of the Authority Having Jurisdiction or on the approved construction documents.

102.5 Alternate Materials and Methods of Construction and Design. This code does not prevent the use of any material, design or method of construction not specifically allowed or prohibited by this code, provided the alternate has been approved and its use authorized by the Authority Having Jurisdiction. The Authority Having Jurisdiction may approve an alternate, provided the Authority Having Jurisdiction finds that the proposed alternate complies with the provisions of this code and that the alternate, when considered together with other safety features of the building or other relevant circumstances, will provide at least an equivalent level of strength, effectiveness, fire resistance, durability, safety and sanitation. The Authority Having

Jurisdiction may require that sufficient evidence or proof be submitted to reasonably substantiate any claims regarding the use or suitability of the alternate. The Authority Having Jurisdiction may, but is not required to, record the approval of alternates and any relevant information in the files of the Authority Having Jurisdiction or on the approved permit application documents.

102.6 Tests. Whenever there is insufficient evidence of compliance with the provisions of this code or evidence that any material or method of construction does not conform to the requirements of this code, the Authority Having Jurisdiction may require tests as proof of compliance, to be made at no expense to the City. Test methods shall be as specified in this code or by other recognized test standards. If there are no recognized and accepted test methods for the proposed alternate, the Authority Having Jurisdiction shall determine the test procedures. All tests shall be made by an approved agency. Reports of such tests shall be provided to the Authority Having Jurisdiction and retained by the Authority having Jurisdiction for the period required for retention of public records.

102.7 Liability. Nothing in this code is intended to be nor shall be construed to create or form the basis for any liability on the part of the Authority Having Jurisdiction or the City, or their officers, employees or agents, for any injury or damage resulting from the failure of equipment to conform to the provisions of this code, or by reason or as a consequence of any inspection, notice, order, certificate, permission or approval authorized or issued or done in connection with the implementation or enforcement of this code, or by reason of any action or inaction on the part of the Authority Having Jurisdiction or the City related in any manner to the enforcement of this code by their officers, employees or agents. This code shall not be construed to lessen or relieve the responsibility of any person owning, operating or controlling any equipment, building or structure for any damages to persons or property caused by defects, nor shall the Authority Having Jurisdiction or the City of Seattle be held to have assumed any such liability by reason of the inspections authorized by this code or any permits or certificates issued under this code.

102.8 Responsibilities of Parties.

102.8.1 Responsibility for Compliance. Compliance with the requirements of this code is the obligation of the owner of the building, structure or premises, the authorized agent of the owner, and other persons responsible for the condition or work, and not of the Authority Having Jurisdiction or the City or any of their officers, employees or agents.

102.8.2 Responsibilities of Registered Design Professional in Responsible Charge. It is the responsibility of the registered design professional in responsible charge to ensure that the information in the plumbing system documents is complete, accurate, and, to the best of the design professional's knowledge, conforms to the requirements of this code.

102.8.3 Responsibilities of Contractor. It is the responsibility of the contractor to perform all the work in conformance with the approved plumbing system documents.

102.8.4 Responsibilities of Plans Examiner. It is the responsibility of the plans examiner to verify that the description of the work in the plumbing system documents is substantially complete, and to require corrections where, to the best of the plans examiner's knowledge, the plumbing system documents do not conform to this code or other pertinent laws and ordinances.

102.8.5 Responsibilities of Field Inspector. It is the responsibility of the field inspector to conduct inspections to verify that the work in progress conforms with the approved plumbing system documents and to require corrections where, to the best of the field inspector's knowledge, the work either does not conform to the plumbing system documents or where the work is in violation of this code or other pertinent laws and ordinances.

SECTION 103 RULES OF THE AUTHORITY HAVING JURISDICTION

103.1 Authority. The Authority Having Jurisdiction has authority to issue interpretations of this code and to adopt and enforce rules and regulations supplemental to this code as may be deemed necessary to clarify the application of the provisions of this code. Such interpretations, rules and regulations shall be in conformity with the intent and purpose of this code.

103.2 Procedure for Adoption of Rules. The Authority Having Jurisdiction shall promulgate, adopt and issue rules according to the procedures specified in the Administrative Code, Chapter 3.02 of the Seattle Municipal Code.

103.3 Construction Codes Advisory Board Committee. A committee of the Construction Codes Advisory Board may examine proposed administrative rules, and amendments relating to this code and related provisions of other codes and make recommendations to the Authority Having Jurisdiction and to the City Council for changes in this code. The committee will be called on as needed by the Construction Codes Advisory Board.

SECTION 104 APPLICATION TO EXISTING PLUMBING SYSTEMS

104.1 Additions, Alterations, Renovations or Repairs. Additions, alterations, renovations or repairs may be made to any plumbing system without requiring the existing plumbing system to comply with all the requirements of this code, if the addition, alteration, renovation or repair conforms to the standards required for a new plumbing system. Additions, alterations, renovations or repairs shall not cause an existing system to become unsafe, unhealthy or overloaded. Minor additions, alterations, renovations, and repairs to existing plumbing systems may be installed in accordance with the law in effect at the time the original installation was made, if approved by the Authority Having Jurisdiction.

104.2 Existing Installations. Plumbing systems lawful at the time of the adoption of this code may continue their use, be maintained or repaired, or have components replaced if the use, maintenance, repair, or component replacement is done in accordance with the basic original design and location, and no hazard to life, health or property has been or is created by such plumbing system.

104.3 Changes in Building Occupancy. Plumbing systems that are a part of a building or structure undergoing a change in occupancy as defined in the International Building Code shall comply with all requirements of this code that are applicable to the new use or occupancy.

104.4 Maintenance. All plumbing systems, materials, equipment, appurtenances and all parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe and hazard-free condition. All devices or safeguards that were required by a code in effect when the plumbing system was installed shall be

maintained in conformance with the code edition under which installed.
The owner or the owner's designated agent is responsible for maintenance of plumbing systems and equipment. To determine compliance with this subsection, the Authority Having Jurisdiction may cause a plumbing system or equipment to be reinspected.

104.5 Health and Safety
Where compliance with the provisions of this code fails to eliminate or alleviate a nuisance, or other dangerous or insanitary condition that involves health or safety hazards, the owner or the owner's agent shall install such additional plumbing and drainage facilities or shall make such repairs or alterations as ordered by the Authority Having Jurisdiction.

104.6 Landmarks—Historic Buildings and Structures.
The Authority Having Jurisdiction may modify the specific requirements of this code as it applies to landmarks and require in lieu thereof alternate requirements that, in the opinion of the Authority Having Jurisdiction, will result in a reasonable degree of safety to the public and the occupants of
those buildings.
For purposes of this section, a landmark is a building or structure: that is subject to a requirement to obtain a certificate of approval from the City Landmarks Preservation Board before altering or making significant changes to specific features or characteristics, that has been nominated for designation and the City Landmarks Preservation Board has not issued a determination regarding designation, that has been designated for preservation by the City Landmarks Preservation Board, that has been designated for preservation by the State of Washington, that has been listed or determined eligible to be listed in the National Register of Historic Places, or that is located in a landmark or special review district subject to a requirement to obtain a certificate of approval before making a change to the external appearance of a structure.

SECTION 105 UNSAFE PLUMBING SYSTEM, EQUIPMENT AND HAZARD CORRECTION ORDER

105.1 Emergency Order. Whenever the Authority Having Jurisdiction finds that any plumbing system or equipment regulated by this code is in such a dangerous and unsafe condition as to constitute an insanitary condition, which may cause an imminent hazard to life or limb, the Authority Having Jurisdiction may issue an emergency order. The emergency order may (1) direct that the plumbing system and equipment be restored to a safe and sanitary condition by a date certain; (2) require that the building, structure or premises, or portion thereof, containing the insanitary plumbing and equipment be vacated within a reasonable time to be specified in the order, or in the case of extreme danger and unsafe condition, the order may specify immediate vacation of the building, structure or premises, or portion thereof; or (3) authorize immediate disconnection of the utilities.

105.1.1 Service of Emergency Order. The order shall be posted on the premises or personally served on the owner of the building or premises or any person responsible for the condition. The order shall specify the time for compliance.

105.1.2 Effect of Emergency Order. No person may occupy a building, structure or premises, or portion thereof, after the date on which the building is required to be vacated until the building, structure or premises, or portion thereof, is restored to a safe and sanitary condition as required by the order and this code. It is a violation for any person to fail to comply with an

emergency order issued by the Authority Having Jurisdiction.

105.2 Hazard Correction Order. Whenever the Authority Having Jurisdiction finds that an unsafe plumbing system or equipment exists, the Authority Having Jurisdiction may issue a hazard correction order specifying the conditions causing the unsafe plumbing, or equipment to be unsafe and directing the owner or other person responsible for the unsafe plumbing or equipment to correct the condition by a date certain. In lieu of correction, the owner may submit a report or analysis to the Authority Having Jurisdiction analyzing said conditions and establishing that the equipment is, in fact, safe. The Authority Having Jurisdiction may require that the report or analysis be prepared by a licensed engineer.

105.2.1 Service of Hazard Correction Order. The order shall be served upon the owner, agent or other responsible person by personal service or regular first class mail addressed to the last known address of such person or if no address is available after reasonable inquiry, the order may be posted in a conspicuous place on the premises. The order may also be posted if served by personal service or first class mail.

105.2.2 Effect of Hazard Correction Order. It is a violation for any person to fail to comply with a hazard correction order as specified in this subsection.

SECTION 106 ENFORCEMENT, VIOLATIONS AND PENALTIES

106.1 Violations. It is a violation of this code for any person to:

(1) Install, erect, construct, enlarge, alter, repair, replace, remodel, move, improve, remove, convert or demolish, equip, occupy, use or maintain any plumbing system or equipment, or cause or permit the same to be done, in the City, contrary to or in violation of any of the provisions of this code.

(2) Knowingly aid, abet, counsel, encourage, hire, induce or otherwise procure another to violate or fail to comply with this code.

(3) Use any material or install any device, appliance or equipment that is subject to this code and has not been approved by the Authority Having Jurisdiction.

(4) Violate or fail to comply with any order issued by the Authority Having Jurisdiction pursuant to the provisions of this code or with any requirements of this code.

(5) Remove, mutilate, destroy or conceal any notice or order issued or posted by the Authority Having Jurisdiction pursuant to the provisions of this code, or any notice or order issued or posted by the Authority Having Jurisdiction in response to a natural disaster or other emergency.

(6) Conduct work under a permit without requesting an inspection as required by Section 116.

106.2 Notice of Violation. If, after investigation, the Authority Having Jurisdiction determines that standards or requirements of this code have been violated or that orders or requirements have not been complied with, the Authority Having Jurisdiction may issue a notice of violation upon the owner, agent, or other person responsible for the action or condition. The notice of violation shall state the standards or requirements violated, shall state what corrective action, if any, is necessary to comply with the standards or requirements, and shall set a reasonable time for compliance.

106.2.1 Service of Notice of Violation. The notice shall be served upon the owner, agent or other responsible person by personal service or regular first class mail addressed to the last known address of such person, or if no address is available after reasonable inquiry, the notice may be posted in a conspicuous place on the

premises. The notice may also be posted if served by personal service or first class mail. Nothing in this section limits or precludes any action or proceeding to enforce this code, and nothing obligates or requires the Authority Having Jurisdiction to issue a notice of violation prior to the imposition of civil or criminal penalties.

106.2.2 Review of Notice of Violation by the Authority Having Jurisdiction. Any person affected by a notice of violation issued pursuant to Section 110.2 may obtain a review of the notice by making a request in writing to the Authority Having Jurisdiction within ten days after service of the notice. When the last day of the period computed is a Saturday, Sunday, or city holiday, the period runs until 5 p.m. of the next business day.

106.2.2.1 Review Procedure. The review shall occur not less than ten nor more than 20 days after the request is received by the Authority Having Jurisdiction unless otherwise agreed to by the person requesting the review. Any person affected by the notice of violation may submit additional information to the Authority Having Jurisdiction. The review shall be made by a representative of the Authority Having Jurisdiction who will review any additional information that is submitted and the basis for issuance of the notice of violation. The reviewer may request clarification of the information received and a site visit.

106.2.2.2 Decision. After the review, the Authority Having Jurisdiction shall:
(1) Sustain the notice;
(2) Withdraw the notice;
(3) Amend the notice; or
(4) Continue the review to a date certain.

106.2.2.3 Order. The Authority Having Jurisdiction shall issue an order containing the decision within 15 days of the date that the review is completed and shall cause the order to be mailed by regular first class mail to the persons requesting the review and the persons named on the notice of violation, addressed to their last known address.

106.3 Stop Work Orders. The Authority Having Jurisdiction may issue a stop work order whenever any work is being done contrary to the provisions of this code, contrary to a permit issued by the Authority Having Jurisdiction, or in the event of dangerous or unsafe conditions related to equipment or construction. The stop work order shall identify the violation and may prohibit work or other activity on the site.

106.3.1 Service of Stop Work Order. The Authority Having Jurisdiction shall serve the stop work order by posting it in a conspicuous place at the site. If posting is not physically possible, then the stop work order may be served by personal service or by regular first class mail to the last known address of: the property owner, the person doing or causing the work to be done, or the holder of a permit if work is being stopped on a permit. For purposes of this section, service is complete at the time of posting or of personal service, or if mailed, three days after the date of mailing. When the last day of the period so computed is a Saturday, Sunday or city holiday, the period runs until 5 p.m. on the next business day.

106.3.2 Effective Date of Stop Work Order. Stop work orders are effective when posted, or if posting is not physically possible, when one of the persons identified in Section 110.3.1 is served.

106.3.3 Review of Stop Work Orders by the Authority Having Jurisdiction. Any person aggrieved by a stop work order may obtain a review of the order by delivering to the Authority Having Jurisdiction a request in writing within two

business days of the date of service of the stop work order.

106.3.3.1 Review Procedure. The review shall occur within two business days after receipt by the Authority Having Jurisdiction of the request for review unless otherwise agreed by the person making the request. Any person affected by the stop work order may submit additional information to the Authority Having Jurisdiction for consideration as part of the review at any time prior to the review. The review will be made by a representative of the Authority Having Jurisdiction who will review all additional information received and may also request a site visit.

106.3.3.2 Decision. After the review, the Authority Having Jurisdiction may:
(1) Sustain the stop work order;
(2) Withdraw the stop work order;
(3) Modify the stop work order; or
(4) Continue the review to a date certain.

106.3.3.3 Order. The Authority Having Jurisdiction shall issue an order containing the decision within two business days after the review is completed and shall cause the order to be sent by regular first class mail to the person or persons requesting the review, any person on whom the stop work order was served, and any other person who requested a copy before issuance of the order, addressed to their last known address.

106.4 Authority to Disconnect Utilities in Emergencies.
The Authority Having Jurisdiction has the authority to disconnect water, fuel-gas utility service or energy supplies to a building, structure, premises or equipment regulated by this code in case of emergency where necessary to eliminate an immediate hazard to life or property. The Authority Having Jurisdiction may enter any building or premises to disconnect utility service. The Authority Having Jurisdiction shall, whenever possible, notify the serving utility, the owner and the occupant of the building, structure or premises of the decision to disconnect prior to taking such action, and shall notify the serving utility, owner and occupant of the building, structure or premises in writing of such disconnection immediately thereafter.

106.5 Authority to Condemn Equipment. Whenever the Authority Having Jurisdiction determines that any equipment or portion thereof regulated by this code is hazardous to life, health or property, the Authority Having Jurisdiction shall order in writing that such equipment either be disconnected, removed or restored to a safe or sanitary condition, as appropriate. The written notice shall fix a date certain for compliance with such order. It is a violation for any person to use or maintain defective equipment after receiving such notice. When any equipment or installation is to be disconnected, the Authority Having Jurisdiction shall give written notice of such disconnection and causes therefore within 24 hours to the serving utility, the owner and the occupant of the building, structure or premises. When any equipment is maintained in violation of this code, and in violation of a notice issued pursuant to the provisions of this section, the Authority Having Jurisdiction shall institute any appropriate action to prevent, restrain, correct or abate the violation.

106.6 Connection After Order to Disconnect. No person shall make connections from any water, energy, fuel or power supply nor supply water, energy or fuel to any equipment regulated by this code that has been disconnected or ordered to be disconnected by the Authority Having Jurisdiction, or the use of which has been ordered to be discontinued by the Authority Having Jurisdiction until the Authority

Having Jurisdiction authorizes the reconnection and use of such equipment.

106.7 Civil Penalties. Any person violating or failing to comply with the provisions of this code is subject to a cumulative civil penalty in an amount not to exceed $500 per day for each violation from the date the violation occurs or begins until the date compliance is achieved. In cases where the Authority Having Jurisdiction has issued a notice of violation, the violation will be deemed to begin, for purposes of determining the number of days of violation, on the date compliance is required by the notice of violation.

106.8 Enforcement in Municipal Court. Civil actions to enforce this code shall be brought exclusively in Seattle Municipal Court, except as otherwise required by law or court rule. In any civil action for a penalty, the City has the burden of proving by a preponderance of the evidence that a violation exists or existed; the issuance of a notice of violation or of an order following a review by the Authority Having Jurisdiction is not itself evidence that a violation exists.

106.9 Judicial Review. Because civil actions to enforce this code must be brought exclusively in Seattle Municipal Court pursuant to Section 106.8, orders of the Authority Having Jurisdiction, including notices of violation issued under this chapter, are not subject to judicial review pursuant to chapter 36.70C RCW.

106.10 Alternative Criminal Penalty. Anyone who violates or fails to comply with any notice of violation or order issued by the Authority Having Jurisdiction pursuant to this code or who removes, mutilates, destroys or conceals a notice issued or posted by the Authority Having Jurisdiction shall, upon conviction thereof, be punished by a fine of not more than $5000 or by imprisonment for not more than 365 days, or by both such fine and imprisonment for each separate violation. Each day's violation shall constitute a separate offense.

106.11 Additional Relief. The Authority Having Jurisdiction may seek legal or equitable relief to enjoin any acts or practices and abate any condition when necessary to achieve compliance.

106.12 Administrative Review by the Authority Having Jurisdiction. Prior to issuance of the plumbing permit, applicants may request administrative review by the Authority Having Jurisdiction of decisions or actions pertaining to the administration and enforcement of this code. Requests shall be addressed to the Authority Having Jurisdiction.

106.13 Administrative Review by the Construction Codes Advisory Board. After administrative review by the Authority Having Jurisdiction, and prior to issuance of the plumbing permit, applicants may request review of decisions or actions pertaining to the application and interpretation of this code by the Construction Codes Advisory Board according to Seattle Building Code Section 105.11, except for stop work orders, notices of violations and revocations of permits. The review will be performed by three or more members of the Construction Codes Advisory Board, chosen by the Board Chair. The Chair shall consider the subject of the review and members' expertise when selecting members to conduct a review. The decision of the review panel is advisory only; the final decision is made by the Authority Having Jurisdiction.

SECTION 107 PERMITS

107.1 Permits Required. Except as otherwise specifically provided in this code, a permit shall be obtained from the Authority Having Jurisdiction prior to each installation, alteration, repair, replacement or remodel of any equipment or plumbing

system regulated by this code. A separate plumbing permit is required for each separate building or structure.

107.2 Work Exempt from Permit. A plumbing permit is not required for the work listed below.

(1) The stopping of leaks in drains, soil, waste, or vent pipes, provided, that when a drainpipe, soil, waste, or vent pipe becomes defective and it becomes necessary to remove and replace the same with new material, the same shall be considered as new work and a permit shall be procured and inspection made as provided in this code.

(2) The clearing of stoppages, including the removal and reinstallation of water closets, or the repairing of leaks in pipes, valves, or fixtures, provided such repairs do not involve or require the replacement or rearrangement of valves, pipes, or fixtures.

107.3 Compliance Required. All work shall comply with this code, even where no permit is required.

107.4 Flood Hazard Areas. In addition to the permit required by this section, all work to be performed in areas of special flood hazard as defined in Chapter 25.06 of the Seattle Municipal Code, subject to additional standards and requirements set forth in Chapter 25.06, the Seattle Floodplain Development Ordinance.

107.5 Emergency Repairs. In the case of an emergency, the installation, alteration or repair of any plumbing system or equipment may be made without a permit, provided that application for a permit is made within the later of 24 hours or one working day from the time when the emergency work was started.

107.6 Application for Permit. To obtain a permit, the applicant shall first file an application in a format determined by the Authority Having Jurisdiction. Every such application shall:

(1) Identify and describe the work to be covered by the permit for which application is made.

(2) Describe the land on which the proposed work is to be done by parcel number, property address or similar description that will readily and clearly locate the proposed building or project.

(3) Provide unit, space suite, floor level, or other information that will clearly identify the location of the project.

(4) Provide the owner's name, address, and phone number of the property.

(5) Provide the contractor's business name, address, phone number of the property.

(6) Be accompanied by plans, diagrams, computations and specifications, equipment schedules and other data as required by the Authority Having Jurisdiction.

(7) Be signed by the owner of the property of building, or the owner's authorized agent, who may be required to submit evidence to indicate such authority.

(8) Give such other data and information as may be required by the Authority Having Jurisdiction.

(9) State the name of the owner and the name, address, and phone number of a contact person.

107.6.1 Plumbing design documents. Plumbing design documents shall be submitted in two or more sets with each application for a permit, or shall be submitted in electronic format determined by the Authority Having Jurisdiction. Diagrams, schedules and other data sufficient to show the adequacy of the plans shall be submitted when required by the Authority Having Jurisdiction.

Exception: The Authority Having Jurisdiction may waive the submission of plumbing design documents where the Authority Having Jurisdiction finds that the nature of the work applied for is such that reviewing plumbing documents is not

necessary to obtain compliance with this code.

107.6.2 Preparation by registered design professionals. Plumbing design documents for all plumbing work shall be prepared and designed by or under the direct supervision of a mechanical engineer licensed to practice under the laws of the State of Washington. Each sheet of plumbing documents shall bear the seal and the signature of the registered design professional before the permit is issued.

Exceptions:

1) Detached one- and two-family dwellings, and townhomes.
2) A person Certified in Plumbing Design (CPD), and a Washington State Licensed PL01 plumber shall be permitted to submit plumbing design documents when the design is prepared in compliance to this code, excepting Appendix A and C.
3) Other work as specified by the Authority Having Jurisdiction.

107.6.3 Design professional in responsible charge. The Authority Having Jurisdiction is authorized to require the owner to engage and designate on the plumbing permit application a registered design professional who shall act as the registered design professional in responsible charge. If the circumstances require, the owner shall designate a substitute registered design professional in responsible charge who shall perform the duties required of the original registered design professional in responsible charge. The Authority Having Jurisdiction shall be notified in writing by the owner if the registered design professional in responsible charge is changed or is unable to continue to perform the duties. The registered design professional in responsible charge is responsible for reviewing and coordinating submittal documents prepared by others, including phased and deferred submittal items, for compatibility with the design and scope of the project.

107.7 Information required on plumbing design documents. The documents shall include the following, as applicable:

107.7.1 Cover sheet. The cover sheet shall include the following:

1) The building and street address of the work
2) Legal description of the property
3) The location (and/or location in the building), floor area, story and type of construction
4) The type of occupancy and occupancy load of all parts of the building as approved by the City's building code review
5) The name and address of the owner and person who prepared the plans
6) Code cycle(s)
7) Index schedule
8) General notes
9) Abbreviations
10) Plumbing symbols
11) Key legend

107.7.2 Plan view and riser diagrams sheets. These documents shall clearly identify all sanitary waste and vents systems, including but not limited to, grease (FOG) system, combination waste and vent system, designated greywater waste piping, etc., storm drainage system, condensate piping, and all potable and non-potable water systems.

107.7.3 Schedules. Schedules shall be provided for the plumbing system design; including but not limited to, sizing (fixture unit loading matrix), materials, fixtures, devices, appurtenances, and appliances.

107.7.3.1 Washington State Energy Code. Schedules shall be included to identify compliance to plumbing components identified in the energy code.

107.7.3.2 Construction details. Construction details shall be submitted when the construction is related to the plumbing design.

107.7.4 Deferred submittals. Deferral of any submittal items shall have the prior approval of the Authority Having Jurisdiction. The registered design professional in responsible charge shall list deferred submittals on the plans for review by the Authority Having Jurisdiction. Documents for deferred submittal items shall be submitted to the registered design professional in responsible charge who shall review them and forward them to the Authority Having Jurisdiction with a notation indicating that the deferred submittal documents have been reviewed and been found to be in general conformance to the plumbing design. The deferred submittal items shall not be installed until the deferred submittal documents have been approved by the Authority Having Jurisdiction.

107.7.5 Application review. The plumbing design documents shall be reviewed by the Authority Having Jurisdiction. Such plumbing design documents may be reviewed by other departments of the City to check compliance with the laws and ordinances under their jurisdiction.

107.7.6 Determination of completeness. Within 28 days after and application is filed, the Authority Having Jurisdiction shall notify the applicant in writing either that the application is complete or that it is not complete, and if not complete, what additional information is required to make it complete. Within 14 days after receiving the additional information, the Authority Having Jurisdiction shall notify the applicant in writing whether the application is now complete or what additional information is necessary. An application shall be deemed to be complete if the Authority Having Jurisdiction does not notify the applicant in writing by the deadlines in this section that the application is incomplete.

107.7.7 Decision on application. Except as provided in Section 108.4 the Authority Having Jurisdiction shall approve, condition or deny the application within 120 days after the Authority Having Jurisdiction notifies the applicant that the application is complete

To determine the number of days that have elapsed after the notification that the application is complete, the following periods shall be excluded:

1) All periods of time during which the applicant has been requested by the Authority Having Jurisdiction to correct plans, perform required studies, or provide additional required information, until the determination that the request has been satisfied. The period shall be calculated from the date the Authority Having Jurisdiction notifies the applicant of the need for additional information until the earlier of the date the Authority Having Jurisdiction determines whether the additional information satisfies the request for information or 14 days after the date the information has been provided to the Authority Having Jurisdiction.

2) If the Authority Having Jurisdiction determines that the information submitted by the applicant under item 1 of this subsection is insufficient, the Authority Having Jurisdiction shall notify the applicant of the deficiencies, and the procedures under item 1 of this subsection shall apply as if a new request for information has been made;

3) All extensions of time mutually agreed upon by the applicant and the Authority Having Jurisdiction.

If a plumbing permit application is substantially revised by the applicant, the time period shall start from the date at

which the revised plumbing permit application is determined to be complete under Section 107.7.6.

SECTION 108 PERMIT ISSUANCE

108.1 Issuance. The application shall be reviewed by the Authority Having Jurisdiction. The application may be reviewed by other departments of the Authority Having Jurisdiction or the City to check compliance with the laws and ordinances under their jurisdiction.

108.1.1 Issuance of Permit. The Authority Having Jurisdiction shall issue a permit to the applicant if the Authority having Jurisdiction finds the following:
(1) The work described in the construction documents substantially conforms to the requirements of this code and other pertinent laws and ordinances;
(2) The fees specified in the Seattle Municipal Code Chapter 22.504 have been paid; and
(3) The applicant has complied with all requirements to be performed prior to issuance of a permit for the work under other pertinent laws, ordinances or regulations, or otherwise imposed by the Authority Having Jurisdiction. When the permit is issued, the applicant o the applicant's authorized agent becomes the permit holder.

108.2 Phased permits. The Authority Having Jurisdiction may authorize installation of a portion or portions of a plumbing system before complete plumbing design documents for the whole plumbing project have been submitted or approved. The applicant shall proceed at the applicant's risk without assurance that a permit for the entire plumbing project will be granted.

108.3 Compliance with Approved Plans and Permit. When the Authority Having Jurisdiction issues a permit, the Authority Having Jurisdiction shall endorse the permit in writing or in electronic format and, where plans are required, stamp the plans "APPROVED." Such approved plans and permit shall not be changed, modified or altered without authorization from the Authority Having Jurisdiction, and all work shall be done in accordance with the approved plans and permit except as authorized by the Authority Having Jurisdiction during a field inspection to correct errors or omissions.

108.4 Revisions to the permit. When changes to the approved work (plumbing design documents) are made during installation, approval of the Authority Having Jurisdiction shall be obtained prior to execution. The Authority Having Jurisdiction may approve minor changes to the plumbing design documents for work without revisions to the approved plumbing design documents when it is determined that the changes conform to the requirements of this code and other pertinent laws, ordinances and other issued permits.

108.5 Validity of Permit. The issuance or granting of a permit or approval of plans shall:
(1) Not be construed to be a permit for, or an approval of, any violation of any of the provisions of this code or other pertinent laws and ordinances.
(2) Not prevent the Authority Having Jurisdiction from requiring the correction of errors in the plans, or from preventing building operations being carried on thereunder when in violation of this code or of other pertinent laws and ordinances of the City.
(3) Not prevent the Authority Having Jurisdiction from requiring correction of conditions found to be in violation of this code or other pertinent laws and ordinances of the City, or
(4) Not be construed to extend the period of time for which any such permit is issued or

otherwise affect any period of time for compliance specified in any notice or order issued by the Authority Having Jurisdiction or other administrative authority requiring the correction of any such conditions.

108.6 Permit Expiration and Renewal. Authority to do the work authorized by a permit expires 18 months from the date of issuance. A permit may be renewed to extend the duration of the permit for an additional 18 months from the original expiration date.

SECTION 109 INSPECTIONS

109.1 General. All construction or work for which a permit is required is subject to inspection by the Authority Having Jurisdiction. In addition, the Authority Having Jurisdiction may make or require inspections of any plumbing work to ascertain compliance with the provisions of this code and other laws and ordinances that are enforced by the Authority Having Jurisdiction.

109.2 Inspection Requests. The owner of the property or the owner's authorized agent, or the person designated by the owner or agent to do the work authorized by a permit shall notify the Authority Having Jurisdiction that work requiring inspection as specified in this section is ready for inspection.

109.3 Access for Inspection. The permit holder and the person requesting any inspections required by this code shall provide access to and means for proper inspection of such work, including safety equipment required by the Washington Industrial Safety and Health Agency. The work shall remain accessible and exposed for inspection purposes until approved by the Authority Having Jurisdiction. Neither the Authority Having Jurisdiction nor the City shall be liable for expense entailed in the required removal or replacement of any material to allow inspection.

109.4 Inspection Record. Work requiring a plumbing permit shall not be commenced until the permit holder or the permit holder's agent has posted an inspection record in a conspicuous place on the premises and in a position that allows the Authority Having Jurisdiction to conveniently make the required entries regarding inspection of the work. This record shall be maintained in such a position by the permit holder or the permit holder's agent until final approval has been granted by the Authority Having Jurisdiction.

109.5 Approvals Required. No work shall be done on any part of the building or structure beyond the point indicated in each successive inspection without first obtaining the written approval of the Authority Having Jurisdiction.

109.5.1 Effect of Approval. Approval as a result of an inspection is not approval of any violation of the provisions of this code or of other pertinent laws and ordinances of the Authority Having Jurisdiction or the City. Inspections presuming to give authority to violate or cancel the provisions of this code or of other pertinent laws and ordinances of the Authority Having Jurisdiction or the City are not valid.

109.6 Operation of Plumbing Equipment. The requirements of this section do not prohibit the operation of any plumbing systems installed to replace existing equipment or fixtures serving an occupied portion of the building in the event a request for inspection of such equipment or fixture has been filed with the Authority Having Jurisdiction not more than 48 hours after such replacement work is completed, and before any portion of such plumbing system is concealed by any permanent portion of the building.

109.7 Special Investigation. If work that requires a permit or approval is commenced or performed prior to making formal application and receiving the Authority Having Jurisdiction's permission to proceed, the Authority Having Jurisdiction may make a special investigation inspection before a permit is issued for the work. If a special investigation is made, a special investigation fee may be assessed in accordance with the Seattle Municipal Code.

109.8 Reinspections. The Authority Having Jurisdiction may require a reinspection if work for which inspection is called is not complete, required corrections are not made, the approved plans are not readily available to the inspector, access is not provided on the date for which inspection is requested, if deviations from the plans that require the approval of the Authority Having Jurisdiction have been made without proper approval, or as otherwise required by the Authority Having Jurisdiction.

109.8.1 Reinspection Fee. The Authority Having Jurisdiction may assess a reinspection fee as set forth in the Seattle Municipal Code Section 22.504.010 for any action for which reinspection is required. In instances where reinspection fees have been assessed, no additional inspection of the work will be performed until the required fees have been paid.

SECTION 110 FEES

110.1 Fees. A fee for each plumbing permit and for other activities related to the enforcement of this code shall be paid as set forth in Seattle Municipal Code Chapter 22.504.

CHAPTER 2
DEFINITIONS

203.0 -A-

* * *

Air Admittance Valve. A device that allows air to enter the plumbing drainage system in one direction, to protect fixture traps from siphonage when negative pressures develop. The device shall prevent sewer gases from entering the interior building atmosphere during static pressure or positive pressure conditions in the plumbing waste system. The device shall be listed to ASSE 1051 or ASSE 1050.

* * *

205.0 -C-

* * *

Circuit Vent. A vent that connects to a group of two or more similar, adjacent fixtures that discharge into a common horizontal waste branch.

* * *

210.0 -H-

* * *

High Distribution Uniformity. A higher than average measurement indicating the evenness with which water is applied to the landscape by an irrigation system.

* * *

218.0 -P-

* * *

Plumbing System. Includes all potable water, ((~~alternate water sources~~)) building supply, and distribution pipes((~~;~~)), all reclaimed or other alternate source water systems, all rainwater systems, all plumbing fixtures and traps; all drainage and vent pipes(s), and all building drains ((~~and building sewers~~)), including their respective joints and connections, devices, receptors, and appurtenances within the property lines of the premises and shall include potable water piping, potable water treating or using equipment, medical gas and medical vacuum systems, ((~~liquid and fuel gas piping and water heaters~~)) and ((~~vents for same~~)): Provided, that no certification shall be required for the installation of a plumbing system within the property lines and outside a building.

* * *

225.0 -W-

* * *

Water Heater ((~~or Water Heating Boiler~~)). ((~~An~~)) Any heating appliance ((~~designed primarily to supply hot~~)) or equipment that heats potable water and supplies such water ((~~for domestic or commercial purposes and equipped with automatic controls limiting~~)) to the potable water ((~~temperature to a maximum of 210°F (99°C)~~)) distribution system, and includes only those appliances that do not exceed pressure of 160 pounds per square inch (1103 kPa), volume of 120 gallons (454 L) and a heat input of 200,000 Btu/hr (58 kW). Appliances and equipment that exceed these values are classified as boilers.

* * *

Wet Procedure Locations. The area in a patient care ((~~space~~)) room where a procedure is performed that is normally subject to wet conditions while patients are present, including standing fluids on the floor or drenching of the work area, either of which condition is intimate to the patient or staff. [NFPA 99:3.3.171]

* * *

CHAPTER 3
GENERAL REGULATIONS

310.4 Use of Vent and Waste Pipes. Except as hereinafter provided in Section 908((~~.0~~)) through Section 911((~~.0~~)), and Appendix C, no vent pipe shall be used as a soil or waste pipe, nor shall a soil or waste pipe be used as a vent. ((~~Also, single-stack drainage and venting systems with unvented branch lines are prohibited~~)).

CHAPTER 4
PLUMBING FIXTURES AND FIXTURE FITTINGS

403.3 Exposed Pipes and Surfaces. Water supply and drain pipes under accessible lavatories and sinks shall be insulated or otherwise be configured to protect against contact. Protectors, insulators, or both shall comply with ASME A112.18.9 ((~~or ASTM C1822~~)).

407.1 Application. Lavatories shall comply with ASME A112.19.1/CSA B45.2, ASME A112.19.2/CSA B45.1, ASME A112.19.3/CSA B45.4, ASME A112.19.12, CSA B45.5/IAPMO Z124, CSA B45.8/IAPMO Z403, CSA B45.11/IAPMO Z401 or CSA B45.8/IAPMO Z403, CSA B45.11/IAPMO Z401 or CSA B45.12/IAPMO Z402.

407.2 Water Consumption. The maximum water use allowed in gallons per minute

(gpm) or liters per minute (lpm) for any of the following faucets and replacement aerators is the following:

Lavatory faucets
2.2 gpm/((~~9.5~~)) 8.5 lpm
Kitchen faucets
2.2 gpm/((~~9.5~~)) 8.5 lpm
Replacement aerators
2.2 gpm/((~~9.5~~)) 8.5 lpm
Public lavatory faucets other than metering
0.5 gpm/1.9 lpm

408.7.2 Chlorinated Polyethylene (CPE) Sheets. Nonplasticized chlorinated polyethylene sheets shall ((~~conform to~~)) comply with ASTM D4068. The liner shall be joined in accordance with the manufacturer's installation instructions.

423.0 Landscape Irrigation.

423.1 Automatic In-Ground Irrigation System Design and Installation. Automatic in-ground irrigation systems shall comply with Sections 423.1.1 through 423.1.3.

423.1.1 Automatic in-ground irrigation systems shall have an automatic clock, electric valves, and the ability to sense rainfall. The component used to sense rainfall shall be exposed to weather and comply with either Item 1 or 2:
(1) Interrupt the circuit to the valve to stop the irrigation clock from watering after a rainfall event, or
(2) Reduce irrigation timing based on the amount of rainfall.
Exception: The following landscaped areas are exempt from this Section 423.1.1:
(1) Landscaped areas located where they do not receive natural precipitation.
(2) Landscaped areas requiring irrigation for only one year of plant establishment before the irrigation system is decommissioned or removed.
(3) Plant nurseries.

423.1.2 Automatic in-ground irrigation shall include the following where applicable:
(1) Low precipitation rate, high distribution uniformity rotary nozzles for sprinklers.
(2) All irrigation sprinklers within each zone shall have matched precipitation rates.
(3) A mainline master valve shall be installed when water for irrigation is municipally supplied.
(4) Sprinklers with internal check valves.
(5) Sprinklers shall have a pop up height of not less than 4 inches.

423.1.3 Landscaped areas greater than 30,000 square feet shall also comply with the following:
(1) Automatic in-ground irrigation systems shall not direct water onto building exterior surfaces, foundations, or exterior paved surfaces, or generate runoff or overspray.

(2) Automatic in-ground irrigation systems shall use controllers to automatically adjust irrigation schedules to changes in evapotranspiration or plant water need through soil moisture or climatological inputs.
(3) Except for centrally controlled automatic in-ground irrigation systems using weather or soil moisture to automatically adjust irrigation run-times, each required technology shall be WaterSense labeled if the WaterSense label is available for that technology.
(4) Irrigation zones shall be based on plant water needs with plants or similar needs grouped together. Turfgrass shall not be grouped with other plantings in the same zone.
(5) All sprinklers and micro-irrigation zones shall comply with manufacturer's specifications for recommending operating pressure.
(6) Sprinklers head spacing shall comply with manufacturer's specifications.
(7) Automatic in-ground irrigation systems shall include a flow sensor, master valve, and smart controller combination that shuts off the valve where abnormal water flow is detected, identifies the location of the abnormal water flow, and signals that there is a flow change at the controller.
(8) The sprinkler application rate shall be less than or equal to 0.5 inch per hour on slopes greater than 1 unit vertical to 4 units horizontal (25% slope).

CHAPTER 5
WATER HEATERS

501.1 Applicability. The regulations of this chapter shall govern the construction, location, and installation of fuel-burning and other types of water heaters heating potable water. The minimum capacity for water heaters shall be in accordance with the first-hour rating listed in Table 501.1(2). See the Mechanical Code for combustion air and installation of all vents and their connectors. No water heater shall be hereinafter installed that does not comply with the manufacturer's installation instructions and the type and model of each size thereof approved by the Authority Having Jurisdiction. A list of accepted water heater appliance standards is are referenced in Table 501.1(1). Listed appliances shall be installed in accordance with the manufacturer's installation instructions. Unlisted water heaters shall be permitted in accordance with Section 504.3.2. Domestic electric water heaters shall comply with UL

174 or UP 1453. Commercial electric water heaters shall comply with UL 1423. Oil-fired water heaters shall comply with UL 732. Solid-fuel-fired water heaters shall comply with UL 2523. Thermal solar water heaters shall comply with Chapter 14 of the International Mechanical Code and UL 174 or UL 1453.

501.1.1 Water Heaters Used for Space Heating. Water heaters utilized both to supply potable hot water and provide hot water for space-heating applications shall be listed and labeled for such applications by the manufacturer and shall be installed in accordance with the manufacturer's instructions and this code.

CHAPTER 6
WATER SUPPLY AND DISTRIBUTION

603.1 General. Cross-connection control shall be provided in accordance with the provisions of this chapter. Devices or assemblies for protection of the public water system must be models approved by the Department of Health under WAC 246-290-490. The Authority Having Jurisdiction shall coordinate with the local water purveyor where applicable in all matters concerning cross-connection control within the property lines of the premises. No person shall install a water-operated equipment or mechanism, or use a water-treating chemical or substance, where it is found that such equipment, mechanism, chemical, or substance causes pollution or contamination of the domestic water supply. Such equipment or mechanism shall be permitted where equipped with an approved backflow prevention device or assembly.

603.2 Approval of Devices or Assemblies. Before a device or an assembly is installed for the prevention of backflow, it shall have first been approved by the authority having jurisdiction. Devices or assemblies shall be tested in accordance with recognized standards or other standards acceptable to the authority having jurisdiction. Backflow prevention devices and assemblies shall comply with Table 603.2, except for specific applications and provisions as stated in Section 603.5.1 through Section 603.5.2((~~1~~))0.

All devices or assemblies installed in a potable water supply system for protection against backflow shall be maintained in good working condition by the person or persons having control of such devices or assemblies. Such devices or assemblies shall be tested in accordance with Section 603.4.2 and WAC 246-290-490. If found to be defective or inoperative, the device or assembly shall be repaired or replaced. No device or assembly shall be removed from use or relocated or other device or assembly substituted, without the approval of the authority having jurisdiction. Testing shall be performed by a Washington State Department of Health certified backflow assembly tester.

603.5.10 Steam or ((~~Hot~~)) Water Boilers. Potable water connections to steam or ((~~hot~~)) water boilers shall be protected by an air gap or reduced pressure principle backflow preventer.

604.14 ((~~Plastic Pipe Termination.~~ ~~Plastic water service piping may terminate within a building, provided the connection to the potable water distribution system shall be made as near as is practical to the point of entry and shall be accessible. Barbed insert fittings with hose clamps are prohibited as a transition fitting within the building.~~))
Termination of Building Supply Piping. The building supply piping shall be permitted to terminate inside of a building or structure when the material is approved water distribution piping in accordance with Table 604.1.
Exception: PVC and PE piping may terminate within a building. The connection to the water distribution system shall be made within 1 foot of the point of entry and shall be accessible. Barbed insert fittings with hose clamps are prohibited as a transition fitting within the building.

608.5 Discharge Piping. The discharge piping serving a temperature relief valve, pressure relief valve, or combination of both shall have no valves, obstructions, or means of isolation and be provided with the following:

(1) Equal to the size of the valve outlet and shall discharge full size to the flood level of the area receiving the discharge and pointing down.
(2) Materials shall be rated at not less than the operating temperature of the system and approved for such use or shall comply with ASME A112.4.1.
(3) Discharge pipe shall discharge independently by gravity through an air gap into the drainage system or outside of the building with the end of the pipe not exceeding 2 feet (610 mm) and not less than 6 inches (152 mm) above the ground and pointing downwards.
(4) Discharge in such a manner that does not cause personal injury or structural damage.
(5) No part of such discharge pipe shall be trapped or subject to freezing.
(6) The terminal end of the pipe shall not be threaded.
(7) Discharge from a relief valve into a water heater pan shall be prohibited.
(8) Relief valve drains shall not terminate in a crawl space.
Exception: Where no drainage was provided, replacement water heating equipment shall only be required to provide a drain pointing downward from the relief valve to extend between 2 feet (610 mm) and six (6) inches (152 mm) from the floor. No additional floor drain need be provided.

CHAPTER 7
SANITARY DRAINAGE

701.2 Drainage Piping. Materials for drainage piping shall be in accordance with one of the referenced standards in Table 701.2 except that:
(1) No galvanized wrought-iron or galvanized steel pipe shall be used underground and shall be kept not less than 6 inches (152 mm) aboveground.
(2) ABS and PVC DWV piping installations shall be installed in accordance with applicable standards referenced in Table ((~~701.2 and Chapter 14 "firestop Protection."~~)) 1701.1. Except for individual single - family dwelling units, materials exposed within ducts or plenums shall have a flame-spread index of not more than 25 and a smoke-developed index of not more than 50, where tested in accordance with ASTM E84 or UL 723. ((~~These tests shall comply with all requirements of the standards to include the sample the sample size, both for width and length. Plastic pipe shall not be tested filled with water.~~))
(3) No vitrified clay pipe or fittings shall be used aboveground or where pressurized by a pump or ejector. They shall be kept not less than 12 inches (305 mm) belowground.
(4) Copper or copper alloy tube for drainage and vent piping shall have a weight of not less than that of copper or copper alloy drainage tube type DWV.
(5) Stainless steel 304 pipe and fittings shall not be installed underground and shall be kept not less than 6 inches (152 mm) aboveground.
(6) Cast-iron soil pipe and fittings ((~~and the stainless steel couplings used to join these products~~)) shall be listed and tested in accordance with standards referenced in Table ((~~701.2~~)) 1701.1. Such pipe and fittings shall be marked with the country of origin, and identification of the original manufacturer((~~'s name or registered trademark as define in the product standards, the third party certifier's~~)) addition to markings, ((~~and the class of the pipe or fitting~~)) required by referenced standards.

704.3 Commercial Sinks. ((~~Pots sinks, scullery sinks, dishwashing sinks, silverware sinks, and other similar fixtures shall be connected~~)) Except where specifically required to be connected indirectly to the drainage system. ((~~A floor drain shall be provided adjacent to the~~)), or when first approved by the Authority Having Jurisdiction, all plumbing fixtures, ((~~and the fixture shall be connected on the sewer side of the floor~~)) drains, ((~~trap, provided that no other~~)) appurtenances, and appliances shall be directly connected to the drainage ((~~line is connected between the floor waste connection and the fixture drain. The fixture and floor drain shall be trapped and vented in accordance with this code~~)) system of the building or premises.

705.10 Joints Between Various Materials. Joints between various materials shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 705.10.1 through Section 705.10.4. Mechanical couplings used to join different materials shall comply with ASTM C1173 for belowground use, ASTM C1460 for aboveground use, or ASTM C1461 for aboveground and belowground use.

707.4 Location. Each horizontal drainage pipe shall be provided with a cleanout at its upper terminal, and each run of piping, that is more than 100 feet (30 480 mm) in total developed length, shall be provided with a cleanout for each 100 feet (30 480 mm), or fraction thereof, in length of such piping. An

additional cleanout shall be provided in a drainage line for each aggregate horizontal change in direction exceeding 135 degrees (2.36 rad). ((~~A cleanout shall be installed above the fixture connection fitting, serving each urinal, regardless of the location of the urinal in the building.~~))

Exceptions:

(1) Cleanouts shall be permitted to be omitted on a horizontal drain line less than 5 feet (1524 mm) in length unless such line is serving sinks or urinals.

(2) Cleanouts shall be permitted to be omitted on a horizontal drainage pipe installed on a slope of 72 degrees (1.26 rad) or less from the vertical angle (one-fifth bend).

(3) Excepting the building drain, its horizontal branches, and urinals, a cleanout shall not be required on a pipe or piping that is above the floor level of the lowest floor of the building.

(4) An approved type of two-way cleanout fitting, installed inside the building wall near the connection between the building drain and the building sewer or installed outside of a building at the lower end of a building drain and extended to grade, shall be permitted to be substituted for an upper terminal cleanout.

707.9 Clearance. Each cleanout in piping 2 inches (50 mm) or less in size shall be so installed that there is a clearance of not less than ((~~18~~)) 12 inches ((~~(457 mm) by 18 inches (457 mm)~~)) in front of the cleanout. Cleanouts in piping exceeding 2 inches (50 mm) shall have a clearance of not less than ((~~24~~)) 18 inches ((~~(610 mm) by 24 inches~~)) (610 mm) in front of the cleanout. Cleanouts in under-floor piping shall be extended to or above the finished floor or shall be extended outside the building where there is less than 18 inches (457 mm) vertical overall, allowing for obstructions such as ducts, beams, and piping, and 30 inches of (762 mm) horizontal clearance from the means of access to such cleanout. No under-floor cleanout shall be located exceeding ((~~5~~)) 20 feet ((~~(1,524 mm)~~)) from an access door, trap door, or crawl hole.

709.1 General. ((~~Where practicable,~~)) Plumbing fixtures shall be drained to the ((~~public sewer or private sewage disposal~~)) sanitary waste system by gravity flow and are permitted to be pumped or ejected as allowed per sections 710.2 or approved by the Authority Having Jurisdiction.

Delete all of Part II, Sections 713 to 723, and Tables 717.1 and 721.1.

CHAPTER 9
VENTS

913.0 Air Admittance Valves

913.1 General. Vent systems utilizing air admittance valves shall comply with this section.

913.2 Where permitted. Individual fixtures, a branch vent, a vertical wet vent, and a horizontal wet vent shall be permitted to terminate with a connection to an air admittance valve. Fixtures connected to an air admittance valve shall be located on the same floor level.

913.3 Installation. Air admittance valves shall conform to ASSE 1051 for single fixtures, and ASSE 1050 for multiple fixtures, and shall be installed as required in this section and the manufactures installations guidelines.

913.3.1 Location.

1) Air admittance valves shall be accessible and located in an area that allows air to enter the valve.

2) The air admittance valve shall be located a minimum of four (4) inches above the trap arm.

3) The air admittance valve that serves as a vent termination for a branch vent, or vertical and horizontal wet vent, shall be located at a minimum of six (6) inches above the flood level rim of the highest fixture being vented.

4) The air admittance valve shall be located within the maximum developed length permitted for the vent as shown in Table 703.2.

5) The air admittance valve shall be installed not less than six (6) inches above insulation materials.

913.4 Size. The air admittance valve shall be rated in accordance with the standard for the vent size as determined in Table 703.2.

913.5 Vent required. Not less than one plumbing vent sized as required by Section 904.1, shall extend to the exterior of the building as required in Section 906.1.

913.6 Relief vent. When a horizontal branch drain utilizes an individual or branch type air admittance valve, a relief vent shall be installed when the horizontal branch drain is located more than four (4) branch intervals from the top of the building drain (waste stack), and the relief vent shall extend to the outdoors or connect to a vent stack.

The relief vent shall be sized in accordance with Section 904.1, installed in accordance with Sections 905.0, and shall be permitted to serve as the vent for other fixtures.

913.6.1 Prior approval. Installations that require a relief vent shall be submitted for an installation design review.

913.7 Prohibited installations.

913.7.1 Sumps. Air admittance valves shall not be utilized to vent sumps or tanks of any type.

913.7.2 Chemical waste systems. Air admittance valves shall not be installed in nonneutralized chemical waste systems without a design review and approval by the Authority Having Jurisdiction.

913.7.3 FOG disposal systems. Air admittance valves shall not be installed on any fixtures that are connected to a FOG disposal system.

913.7.4 Plenums. Air admittance valves shall not be located in spaces utilized as supply or return air plenums.

CHAPTER 10
TRAPS AND INTERCEPTORS

1007.3 Trap priming water. Trap primers serving floor drains located in rooms that contain fixtures served by a nonpotable water system complying with Chapter 15 or 16 shall also be served by the nonpotable water system.

1014.1 General. Where it is determined by the Authority Having Jurisdiction that waste pretreatment is required, an approved type of grease interceptor(s) complies with ASME A112.14.3, ASME A112.14.4, CSA B481, PDI G-101, or PDI G-102, and sized in accordance with Section 1014.2.1 or Section 1014.3.6, shall be installed in accordance with the manufacturer's installation instructions to receive the drainage from fixtures or equipment that produce grease-laden waste located in areas of establishments where food is prepared, or other establishments where grease is introduced into the drainage or sewage system in quantities that can effect line stoppage or hinder sewage treatment or private sewage disposal systems. A combination of hydromechanical, gravity grease interceptors and engineered systems shall be allowed to meet this code and other applicable requirements of the Authority Having Jurisdiction where space or existing physical constraints of existing buildings necessitate such installations. A grease interceptor shall not be required for individual dwelling units or private living quarters. Water closets, urinals, and other plumbing fixtures conveying human waste shall not drain into or through the grease interceptor.

Exception: A single family home that has an approved commercial kitchen, or prepares food for public sale, shall install a grease interceptor that complies to Section 1014.0 for all fixtures that produce grease (FOG) waste.

1014.1.3 Food Waste Disposers and Dishwashers. No food waste disposer or dishwasher shall be connected to or discharge into a grease interceptor. ((~~Commercial food waste disposers shall be permitted to discharge directly into the building's drainage system.~~))

Exception: Food waste disposers shall be permitted to discharge to grease interceptors that are designed to receive the discharge of food waste, or a listed food solids interceptor shall be installed at the discharge of the food waste disposer.

1018.0 Parking Garage Drainage Systems. Parking garage drainage systems shall comply with Sections 1018.1 through 1018.3. All plans for parking garage floor drainage systems shall be submitted to the authority having jurisdiction prior to installation for approval.

CHAPTER 11
STORM DRAINAGE

1101.4 Material Uses. Pipe, tube, and fittings conveying rainwater shall be of such materials and design as to perform their intended function to the satisfaction of the Authority Having Jurisdiction. Conductors within a vent or shaft shall be of cast-iron, galvanized steel, wrought iron, copper, copper alloy, lead, Schedule 40 ABS DWV, Schedule 40 PVC DWV, stainless steel 304 or 316L [stainless steel 304 pipe and fittings shall not be installed underground and shall be kept not less than 6 inches (152 mm) aboveground], or other approved materials, and changes in direction shall ((~~be in accordance with~~)) conform to the requirements of Section 706.0. ABS and PVC DWV piping installations shall be installed in accordance with ((~~applicable standards referenced in Table 1701.1 and Chapter 14 "Firestop Protection."~~)) IS 5 and IS 9. Except for individual single-family dwelling units, materials exposed within ducts or plenums shall have a flame-spread index of not more than 25 and a smoke developed index of not more than 50, where tested in accordance with ASTM E84 or UL 723. ((~~These tests shall comply with all requirements of the standards to include the sample size, both for width and length. Plastic pipe shall not be tested filled with water.~~))

1101.13 Cleanouts. Cleanouts for building storm drains shall comply with the requirements of this section ((~~719.0 of this code~~)).

((~~**1101.13.1 Rain Leaders and Conductors.** Rain leaders and conductors connected to a building storm sewer shall have a cleanout installed at the base of the outside leader or outside conductor before it connects to the horizontal drain.~~))

1101.13.1 Locations. Rain leaders and conductors connected to a building storm sewer shall have a cleanout installed at the base of the outside leader or outside conductor before it connects to the horizontal drain. Cleanouts shall be placed inside the building near the connection between the building drain and the building sewer or installed outside the building at the lower end of the building drain and extended to grade.

1101.13.2 Cleaning. Each cleanout shall be installed so that it opens to allow cleaning in the direction of flow of the soil or waste or at right angles thereto, and except in the case of wye branch and end-of-line cleanouts, shall be installed vertically above the flow line of the pipe.

1101.13.3 Access. Cleanouts installed under concrete or asphalt paving shall be made accessible by yard boxes, or extending flush with paving with approved materials and be adequately protected.

1101.13.4 Manholes. Approved manholes may be installed in lieu of cleanouts when first approved by the authority having jurisdiction. The maximum distance between manholes shall not exceed three hundred (300) feet (91.4 m).

The inlet and outlet connections shall be made by the use of a flexible compression joint no closer than twelve (12) inches (305 mm) to, and not farther than three (3) feet (914 mm) from the manhole. No flexible compression joints shall be embedded in the manhole base.

1105.0 Controlled-Flow Roof Drainage. This section is not adopted.

CHAPTER 13
HEALTH CARE FACILITIES AND MEDICAL GAS AND MEDICAL VACUUM SYSTEMS

1301.4 Terms. Where the terms medical gas or medical support gas occurs, the provisions shall apply to all piped systems for oxygen, nitrous oxide, medical air, carbon dioxide, helium, nitrogen, instrument air, and mixtures thereof. Wherever the name of a specific gas service occurs, the provision shall apply only to that gas. [NFPA 99:5.1.1.3]

1303.8 Water ((~~Supply~~)) Mains for Hospitals. Hospitals shall be provided with not less than two approved potable water ((~~sources~~)) mains that are installed in such a manner as to prevent the interruption of water service.

1305.3 Minimum Station Outlets ((~~and~~)) / Inlets. Station outlets and inlets for medical gas and medical vacuum systems for facilities licensed or certified by the Washington State Department of Health (DOH) or Washington State Department of Social and Health Services (DSHS) shall be provided as listed in Chapters 246-320 and 246-330 WAC as required by the applicable licensing rules as applied by DOH Construction Review Services. All other medical gas and medical vacuum systems shall be provided as listed in Table 1305.3.

1306.3 Health Care Organization Personnel. Health care organization personnel shall be permitted to install piping systems if all of the requirements of Section ((~~1306.0~~)) 1306.1 through 1306.2.1 are met during the installation. [NFPA 99:5.1.10.11.10.6]

1308.5 Tubes for Medical Vacuum Systems. Piping for medical vacuum systems shall be constructed of ((~~any~~)) one of the following:
(1) Hard-drawn seamless copper tube in accordance with one of the following:
(a) ASTM B88 copper tube (Type K, L, or M)
(b) ASTM B280 copper ACR tube
(c) ASTM B819 copper medical gas tubing (Type K or L)
(2) Stainless steel tube in accordance with the following:
(a) ASTM A269 TP304L or 316L.
(b) ASTM A312 TP304L or 316L.
(c) ASTM A312 TP 304L/316L, Sch 5S pipe, and ASTM A403 WP304L/316L, Sch 5S fittings. [NFPA 99:5.1.10.2.1]

1309.3 Medical Vacuum Systems. Medical ((~~Vacuum~~)) vacuum systems shall be permitted to have branch connections made using mechanically formed, drilled, and extruded tee-branch connections that are formed in accordance with the tool manufacturer's instructions. Such branch connections shall be joined by brazing, as described in Section 1309.4. [NFPA 99:5.1.10.3.2]

1309.4.2 Filler Metals. Filler metals shall bond with and be metallurgically compatible with the base metals being joined. ((~~Filler metals shall comply with AWS A5.8 [NFPA 99:5.1.10.4.1.5,5.1.10.4.1.6]~~))

CHAPTER 15
ALTERNATE WATER SOURCES FOR NONPOTABLE APPLICATIONS

1501.1.1 Allowable Use of Alternate Water. Where approved or required by the authority having jurisdiction, alternate water sources (reclaimed (recycled) water, gray water and on-site treated nonpotable water) shall be permitted to be used in lieu of potable water for the applications identified in this chapter. Reclaimed (recycled) water shall not be used to flush toilets or for other indoor use in any residential property or dwelling unit where residents have access to plumbing systems for repairs or modifications.

CHAPTER 16
NONPOTABLE RAINWATER CATCHMENT SYSTEMS

1601.1 Applicability. The provisions of this chapter and the Washington state department of health shall apply to the construction, alteration, and repair of nonpotable rainwater catchment systems.

CHAPTER 17
REFERENCED STANDARDS

TABLE 1701.1
((~~REFERENCED STANDARDS~~))
STANDARDS FOR MATERIALS, EQUIPMENT, JOINTS AND CONNECTIONS

Where more than one standard has been listed for the same material or method, the relevant portions of all such standards shall apply.

Part I—Administrative

CHAPTER 1

ADMINISTRATION

Note: Chapter 1 is entirely Seattle amendments to the *International Residential Code* and is not underlined.

SECTION R101
TITLE, SCOPE AND PURPOSE

R101.1 Title. This subtitle shall be known as the "*Seattle Residential Code*" and may be so cited, and is referred to herein as "this code."

R101.2 Scope. This code applies to the construction, *alteration*, moving, addition, replacement, demolition, repair, *equipment*, location, removal, use and occupancy of detached one- and two-family dwellings, *adult family homes*, and townhouses not more than three stories above grade plane in height with a separate means of egress and their *accessory structures* not more than three stories above grade plane in height.

Exceptions:

1. Live/work units located in townhouses and complying with the requirements of Section 419 of the *International Building Code* are permitted to be constructed in accordance with this code. Fire suppression *equipment* required by Section 419.5 of the *International Building Code* shall conform to Section P2904 of this code.
2. Owner-occupied lodging houses with one or two guestrooms are permitted to be constructed in accordance with this code.
3. Owner-occupied lodging houses with three to five guestrooms are permitted to be constructed in accordance with this code when equipped with a fire sprinkler system that complies with Section P2904.
4. Floating on-water residences as defined in Seattle Municipal Code Title 23 are not required to comply with this Code.

Note: The seismic design for wood-frame buildings with more than two stories above grade are required to comply with the *International Building Code* or other standards referenced in Section R301.1. See Sections R301.2.2.3 and Table R602.10.3(3).

Interpretation R101.2a: Buildings with mixed occupancies, other than residences with home occupations, are not within the scope of the *Seattle Residential Code* and shall comply with the *Seattle Building Code*.

Interpretation R101.2b: Three or more dwellings located above a common garage or other common space are required to comply with the *Seattle Building Code*. Units in detached one- and two-family dwellings may share common space.

R101.3 Applicability of city laws. A building permit application shall be considered under the applicable city law in effect on the date a valid and fully complete building permit application is submitted or on a date as otherwise required by law.

Exception: For any project for which an associated, unexpired master use permit has been issued, a building permit application shall be considered under the versions of Seattle Municipal Code Title 23, Seattle Land Use Code; Seattle Municipal Code Chapter 25.09, Environmentally Critical Areas regulations; and Seattle Municipal Code Chapter 25.09, Tree Protection regulations in effect on the date established by Seattle Municipal Code Section 23.76.026 or 23.76.032.C.1 for consideration of the master use permit, unless that date is later than the date of the complete building permit application. This exception does not apply to a subdivision or short subdivision component of a master use permit.

Note: Applicable city law includes but is not limited to the Seattle Municipal Code Title 23, Seattle Land Use Code; Seattle Municipal Code Chapter 25.09, Environmentally Critical Areas regulations; Seattle Municipal Code Chapter 25.09, Tree Protection regulations; and the Seattle Residential, Energy, Stormwater, Grading and Side Sewer codes.

R101.3.1 Complete building permit applications. A building permit application is complete if the *building official* determines it meets the requirements of Sections R105.5 through R105.6.4, and the application includes, without limitation, the *construction documents* for the architectural and structural components of the building.

Exception: If the *building official* allows a building permit application to be submitted in phases for portions of a building, each phased portion submittal shall meet the requirements of Sections R105.5 through R105.6.4 applicable to the scope of

the allowed phased portion, and the building permit application shall be considered complete for the purposes of Section R101.3 on the date the phased portion submittal that includes the structural frame for the entire building is submitted.

R101.4 Purpose. The purpose of this code is to provide minimum standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, quality of materials, occupancy, location and maintenance of buildings and structures within the City and certain *equipment* specifically regulated herein. The purpose of this code is to provide for and promote the health, safety and welfare of the general public, and not to create or otherwise establish or designate any particular class or group of persons who will or should be especially protected or benefitted by the terms of this code.

R101.5 Internal consistency. Where in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive governs. Where there is a conflict between a general requirement and a specific requirement, the specific requirement governs.

R101.6 Referenced codes and standards. The codes and standards referenced in this code are considered part of this code to the extent prescribed by each such reference. If differences occur between provisions of this code and referenced codes and standards, the provisions of this code apply, except that nothing in this code limits the effect of any provision of the Grading Code, Stormwater Code, or Regulations for Environmentally Critical Areas.

Exception: Where enforcement of a code provision would violate the conditions of the listing of the *equipment* or *appliance*, the conditions of the listing and manufacturer's instructions apply.

R101.7 Appendices. Provisions in the appendices of the *International Residential Code* do not apply unless specifically adopted.

R101.8 Metric units. Wherever in this code there is a conflict between metric units of measurement and U.S. customary units, the U.S. customary units govern.

SECTION R102
UNSAFE BUILDINGS, STRUCTURES OR PREMISES

R102.1 Emergency order. Whenever the *building official* finds that any building or structure or premises, or portion thereof is in such a dangerous and unsafe condition as to constitute an imminent hazard to life or limb, the *building official* may issue an emergency order. The emergency order may (1) direct that the building, structure or premises, or portion thereof be restored to a safe condition by a date certain; (2) require that the building, structure or premises, or portion thereof, be vacated within a reasonable time to be specified in the order, or in the case of extreme danger, may specify immediate vacation of the building, structure or premises, or portion thereof; or (3) authorize immediate disconnection of the utilities or energy source.

R102.1.1 Service of emergency order. The order shall be posted on the premises or personally served on the owner of the building or premises or any person responsible for the condition. The order shall specify the time for compliance.

R102.1.2 Effect of emergency order. No person may occupy a building, structure or premises, or portion thereof, after the date on which the building is required to be vacated until the building, structure or premises, or portion thereof, is restored to a safe condition as required by the order and this code. It is a violation for any person to fail to comply with an emergency order issued by the *building official.*

R102.2 Hazard correction order. Whenever the *building official* finds that an unsafe building, structure or premises exists, the *building official* may issue a hazard correction order specifying the conditions causing the building, structure or premises to be unsafe and directing the owner or other person responsible for the unsafe building, structure or premises to correct the condition by a date certain. In lieu of correction, the owner may submit a report or analysis to the *building official* analyzing said conditions and establishing that the building, structure or premises is, in fact, safe. The *building official* may require that the report or analysis be prepared by a licensed engineer and may require compliance with *International Existing Building Code*.

R102.2.1 Service of hazard correction order. The order shall be served upon the owner, agent or other responsible person by personal service or regular first class mail addressed to the last known address of such person or if no address is available after reasonable inquiry, the order may be posted in a conspicuous place on the premises. The order may also be posted if served by personal service or first class mail.

R102.2.2 Effect of hazard correction order. It is a violation for any person to fail to comply with a hazard correction order as specified in this subsection.

SECTION R103
ENFORCEMENT, VIOLATIONS AND PENALTIES

R103.1 Violations. It is a violation of this code for any person to:

1. Erect, construct, enlarge, repair, move, improve, remove, convert, demolish, equip, occupy, inspect or maintain any building or structure, or cause or permit the same to be done, in the City, contrary to or in violation of any of the provisions of this code;

2. Knowingly aid, abet, counsel, encourage, hire, induce or otherwise procure another to violate or fail to comply with this code;
3. Use any material or to install any device, *appliance* or *equipment* that does not comply with applicable standards of this code or that has not been *approved* by the *building official;*
4. Violate or fail to comply with any notice or order issued by the *building official* pursuant to the provisions of this code or with any requirements of this code;
5. Remove, mutilate, destroy or conceal any notice or order issued or posted by the *building official* pursuant to the provisions of this code, or any notice or order issued or posted by the *building official* in response to a natural disaster or other emergency;
6. Conduct work under a permit without requesting an inspection as required by Section R106.

R103.2 Notice of violation. If, after investigation, the *building official* determines that standards or requirements of this code have been violated or that orders or requirements have not been complied with, the *building official* may issue a notice of violation upon the owner, agent or other person responsible for the action or condition. The notice of violation shall state the standards or requirements violated, shall state what corrective action, if any, is necessary to comply with the standards or requirements, and shall set a reasonable time for compliance.

R103.2.1 Service of notice of violation. The notice shall be served upon the owner, agent or other responsible person by personal service or regular first class mail addressed to the last known address of such person, or if no address is available after reasonable inquiry, the notice may be posted in a conspicuous place on the premises. The notice may also be posted if served by personal service or first class mail. Nothing in this section limits or precludes any action or proceeding to enforce this code, and nothing obligates or requires the *building official* to issue a notice of violation prior to the imposition of civil or criminal penalties.

R103.2.2 Review of notice of violation by the building official. Any person affected by a notice of violation issued pursuant to Section R103.2 may obtain a review of the notice by making a request in writing to the *building official* within ten days after service of the notice. When the last day of the period computed is a Saturday, Sunday, or City holiday, the period runs until 5 p.m. of the next business day.

R103.2.2.1 Review procedure. The review shall occur not less than ten nor more than 20 days after the request is received by the *building official* unless otherwise agreed to by the person requesting the review. Any person affected by the notice of violation may submit additional information to the *building official.* The review shall be made by a representative of the *building official* who will review any additional information that is submitted and the basis for issuance of the notice of violation. The reviewer may request clarification of the information received and may conduct a site visit.

R103.2.2.2 Decision. After the review, the *building official* shall:

1. Sustain the notice;
2. Withdraw the notice;
3. Continue the review to a date certain; or
4. Amend the notice.

R103.2.2.3 Order. The *building official* shall issue an order containing the decision within 15 days of the date that the review is completed and shall cause the order to be mailed by regular first class mail to the persons requesting the review and the persons named on the notice of violation, addressed to their last known address.

R103.3 Stop work orders. The *building official* may issue a stop work order whenever any work is being done contrary to the provisions of this code, or contrary to a permit issued by the *building official,* or in the event of dangerous or unsafe conditions related to construction or demolition. The stop work order shall identify the violation and may prohibit work or other activity on the site.

R103.3.1 Service of stop work order. The *building official* shall serve the stop work order by posting it in a conspicuous place at the site. If posting is not physically possible, then the stop work order may be served by personal service or by regular first class mail to the last known address of: the property owner, the person doing or causing the work to be done, or the holder of a permit if work is being stopped on a permit. For purposes of this section, service is complete at the time of posting or of personal service, or if mailed, three days after the date of mailing. When the last day of the period so computed is a Saturday, Sunday or city holiday, the period runs until 5 p.m. on the next business day.

R103.3.2 Effective date of stop work order. Stop work orders are effective when posted, or if posting is not physically possible, when one of the persons identified in Section R103.3.1 is served or, if notice is mailed, three days after the date of mailing.

R103.3.3 Review of stop work orders by the building official. Any person aggrieved by a stop work order may obtain a review of the order by delivering to the *building official* a request in writing within two business days of the date of service of the stop work order.

R103.3.3.1 Review procedure. The review shall occur within two business days after receipt by the *building official* of the request for review unless otherwise agreed by the person making the request. Any person affected by the stop work order may submit additional information to the *building official* for consideration as part of the review at any time prior to the review. The review will be made by a representative of the *building official* who will review all additional information received and may conduct a site visit.

R103.3.3.2 Decision. After the review, the *building official* may:

1. Sustain the stop work order;
2. Withdraw the stop work order;
3. Modify the stop work order; or
4. Continue the review to a date certain.

R103.3.3.3 Order. The *building official* shall issue an order of the *building official* containing the decision within two business days after the review is completed and shall cause the order to be sent by regular first class mail to the person or persons requesting the review, any person on whom the stop work order was served, and any other person who requested a copy before issuance of the order, addressed to their last known address.

R103.4 Occupancy violations. Whenever any building or structure is being occupied contrary to the provisions of this code, the *building official* may order such occupancy discontinued and the building or structure, or portion thereof, vacated by notice.

R103.4.1 Service of notice of occupancy violation. The notice of occupancy violation shall be served upon the owner, agent or other responsible person by personal service or regular first class mail addressed to the last known address of such person or if no address is available after reasonable inquiry, the notice may be posted in a conspicuous place on the premises. The notice may also be posted if served by personal service or first class mail.

R103.4.2 Compliance with notice of occupancy violation. Any person occupying the building or structure shall discontinue the occupancy by the date specified in the notice of the *building official,* or shall make the building or structure, or portion thereof, comply with the requirements of this code; provided, however, that in the event of an unsafe building, Section 102 may apply.

R103.5 Civil penalties. Any person violating or failing to comply with the provisions of this code shall be subject to a cumulative civil penalty in an amount not to exceed $500 per day for each violation from the date the violation occurs or begins until compliance is achieved. In cases where the *building official* has issued a notice of violation, the violation will be deemed to begin, for purposes of determining the number of days of violation, on the date compliance is required by the notice of violation.

R103.6 Enforcement in Municipal Court. Civil actions to enforce this chapter shall be brought exclusively in Seattle Municipal Court, except as otherwise required by law or court rule. In any civil action for a penalty, the City has the burden of proving by a preponderance of the evidence that a violation exists or existed; the issuance of the notice of violation or of an order following a review by the *building official* is not itself evidence that a violation exists.

R103.7 Judicial review. Because civil actions to enforce Seattle Municipal Code (SMC) Title 22 must be brought exclusively in Seattle Municipal Court pursuant to Section R103.6, orders of the *building official* including notices of violation issued under this chapter are not subject to judicial review pursuant to Chapter 36.70C RCW.

R103.8 Alternative criminal penalty. Anyone who violates or fails to comply with any notice of violation or order issued by the *building official* pursuant to this code or who removes, mutilates, destroys or conceals a notice issued or posted by the *building official* shall, upon conviction thereof, be punished by a fine of not more than $5000 or by imprisonment for not more than 365 days, or by both such fine and imprisonment for each separate violation. Each day's violation shall constitute a separate offense.

R103.9 Additional relief. The *building official* may seek legal or equitable relief to enjoin any acts or practices and abate any condition when necessary to achieve compliance.

R103.10 Administrative review by the building official. Prior to issuance of the building permit, applicants may request administrative review by the *building official* of decisions or actions pertaining to the administration and enforcement of this code. Requests shall be addressed to the *building official.*

R103.11 Administrative review by the Construction Codes Advisory Board. After administrative review by the *building official* and prior to issuance of the building permit, applicants may request review of decisions or actions pertaining to the application and interpretation of this code by the Construction Codes Advisory Board, except for stop work orders, notices of violations and revocations of permits. The review will be performed by three or more members of the Construction Codes Advisory Board, chosen by the Board Chair. The Chair shall consider the subject of the review and members' expertise when selecting members to conduct a review. The decision of the review panel is advisory only; the final decision is made by the *building official.*

R103.12 Recording of notices. The *building official* may record a copy of any order or notice with the Department of Records and Elections of King County.

R103.13 Appeal to Superior Court. Final decisions of the Seattle Municipal Court on enforcement actions authorized by Title 22 may be appealed pursuant to the Rules for Appeal of Decisions of Courts of Limited Jurisdiction.

SECTION R104
ORGANIZATION AND DUTIES

R104.1 Jurisdiction of Department of Construction and Inspections. The Department of Construction and Inspections is authorized to administer and enforce this code. The Department of Construction and Inspections is under the administrative and operational control of the Director, who is the *building official.*

R104.2 Designees. The *building official* may appoint such officers, inspectors, assistants and employees as are authorized from time to time. The *building official* may authorize such employees and other agents as may be necessary to carry out the functions of the *building official.*

R104.3 Right of entry. With the consent of the owner or occupier of a building or premises, or pursuant to a lawfully issued warrant, the *building official* may enter a building or premises at any reasonable time to perform the duties imposed by this code.

R104.4 Modifications. The *building official* may modify the requirements of this code for individual cases provided the *building official* finds: (1) there are practical difficulties involved in carrying out the provisions of this code; (2) the modification is in conformity with the intent and purpose of this code; and (3) the modification will provide a reasonable level of strength, effectiveness, fire resistance, durability, safety and sanitation when considered together with other safety features of the building or other relevant circumstances. The *building official* may, but is not required to, record the approval of modifications and any relevant information in the files of the *building official* or on the *approved construction documents.*

R104.5 Alternate materials, methods of construction and design. This code does not prevent the use of any material, design or method of construction not specifically allowed or prohibited by this code, provided the alternate has been *approved* and its use authorized by the *building official.* The *building official* may approve an alternate, provided the *building official* finds that the proposed alternate complies with the provisions of this code and that the alternate, when considered together with other safety features of the building or other relevant circumstances, will provide at least an equivalent level of strength, effectiveness, fire resistance, durability, safety and sanitation. Certain code alternates have been pre-*approved* by the *building official* and are identified in this code as code alternates. The *building official* may require that sufficient evidence or proof be submitted to reasonably substantiate any claims regarding the use or suitability of the alternate. The *building official* may, but is not required to, record the approval of code alternates and any relevant information in the files of the *building official* or on the *approved construction documents.*

R104.6 Flood hazard areas. The *building official* shall not approve modifications or code alternates to any provisions required in flood hazard areas identified in Table R301.2(1) unless the *building official* has determined that any of the following conditions exist:

1. There is good and sufficient cause showing that the unique characteristics of the size, configuration or topography of the site render the elevation standards of Section R322 inappropriate.
2. Failure to approve the modification or code alternate would result in exceptional hardship.
3. The approval of the modification or code alternate will not result in increased flood heights, additional threats to public safety, or additional public expense.

Any modification or code alternate that is *approved* shall be the minimum necessary to afford relief, considering the flood hazard.

If a modification or code alternate is *approved*, the *building official* shall give written notice to the applicant that describes the difference between the design flood elevation and the elevation to which the building is to be built, warns that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and states that construction below the design flood elevation increases risks to life and property.

R104.7 Tests. Whenever there is insufficient evidence of compliance with any of the provisions of this code or evidence that any material or construction does not conform to the requirements of this code, the *building official* may require tests as proof of compliance to be made at no expense to the City. Test methods shall be specified by this code or by other recognized test standards. If there are no recognized and accepted test methods for the proposed alternate, the *building official* shall determine the test procedures. All tests shall be made by an *approved agency*. Reports of such tests shall be retained by the *building official* for the period required for retention of public records.

R104.8 Rules of the building official. The *building official* has authority to issue interpretations of this code and to adopt and enforce rules and regulations supplemental to this code as may be deemed necessary in order to clarify the application of the provisions of this code. Such interpretations, rules and regulations shall be in conformity with the intent and purpose of this code.

R104.8.1 Procedure. The *building official* shall promulgate, adopt and issue rules according to the procedures specified in the Administrative Code, Chapter 3.02 of the *Seattle Municipal Code.*

R104.9 Liability. Nothing in this code is intended to be nor shall be construed to create or form the basis for any liability on the part of the City, or its officers, employees or agents, for any injury or damage resulting from the failure of a building to conform to the provisions of this code, or by reason or as a consequence of any inspection, notice, order, certificate, permission or approval authorized or issued or done in connection with the implementation or enforcement of this code, or by reason of any action or inaction on the part of the City related in any manner to the enforcement of this code by its officers, employees or agents.

This code shall not be construed to relieve or lessen the responsibility of any person owning, operating or controlling any building or structure for any damages to persons or property caused by defects, nor shall the Department of Construction and Inspections or the City of Seattle be held to have assumed any such liability by reason of the inspections authorized by this code or any permits or certificates issued under this code.

R104.10 Responsibilities of parties.

R104.10.1 Responsibility for compliance. Compliance with the requirements of this code is the obligation of the owner of the building, structure, or premises; the duly authorized agent of the owner; and other persons responsible for the condition or work, and not of the City or any of its officers, employees or agents.

R104.10.2 Responsibility of design professional, contractor, plans examiner and inspector. The responsibilities of the *design professional* in responsible charge, contractor, plans examiner, and field inspector are as provided in the *International Building Code* Section 104.10.

SECTION R105
BUILDING PERMITS

R105.1 Permits required. Except as otherwise specifically provided in this code, a building permit shall be obtained from the *building official* for each building or structure prior to erecting, constructing, enlarging, altering, repairing, moving, improving, removing, changing the occupancy of, or demolishing such building or structure, or allowing the same to be done. All work shall comply with this code, even where no permit is required.

R105.2 Work exempt from permit. A building permit is not required for the work listed below. Exemption from the permit requirements of this code does not authorize any work to be done in any manner in violation of this code or any other laws or ordinances of the City.

1. Minor repairs or *alterations* if the value of construction, as determined by the *building official*, is $6,000 or less in any six month period. Such repairs and *alterations* shall not include the removal, reduction, *alteration* or relocation of any loadbearing support. Egress, light, ventilation and fire-resistance shall not be reduced without a permit.
2. Minor work including the following, provided no changes are made to the building envelope: patio and concrete slabs on grade; painting or cleaning a building; repointing a chimney; installing kitchen cabinets, paneling or other surface finishes over existing wall and ceiling systems; insulating existing buildings; abatement of hazardous materials; and in-kind or similar replacement of or repair of deteriorated members of a structure.
3. One-story detached accessory buildings used for greenhouse, tool or storage shed, playhouse, or similar uses, if:
   - 3.1. The projected roof area does not exceed 120 square feet; and
   - 3.2. The building is not placed on a concrete foundation other than a slab on grade.
4. Fences not over 8 feet high that do not have masonry or concrete elements above 6 feet.
5. Arbors and other open-framed landscape structures not exceeding 120 square feet in projected area.
6. Retaining walls and rockeries which are not over 4 feet in height measured from the bottom of the footing to the top of the wall, if:
   - 6.1. There is no surcharge or impoundment of Class I, II or III-A liquids;
   - 6.2. The wall or rockery is not located in an Environmentally Critical Area (ECA) or ECA buffer pursuant to chapter 25.09 of the *Seattle Municipal Code;*
   - 6.3. Construction does not support soils in a steep slope area, potential landslide area or known slide area as identified in the Seattle Environmentally Critical Areas Ordinance, Section 25.09.020 of the *Seattle Municipal Code.*
   - 6.4. Possible failure would likely cause no damage to adjoining property or structures.
7. Platforms, walks and driveways not more than 18 inches above grade and not over any *basement* or story below.
8. Window awnings supported by an *exterior wall* when projecting not more than 54 inches.
9. Prefabricated swimming pools, spas and similar *equipment* accessory to a building subject to this code in which the pool walls are entirely above the adjacent grade and if the capacity does not exceed 5,000 gallons.

10. Replacement of siding. This shall not include structural changes, replacement of sheathing or *alteration* to doors and windows. See Energy Code Sections R503.1.1, Exceptions 2 and 3.
11. Roof recover.
12. Roof replacement if no changes are made to the building envelope other than adding or replacing insulation, and the work is equivalent to or better than the existing structure. Permits are required for structural changes and replacement of sheathing of any size. See Energy Code Sections R503.1.1, Exceptions 2 and 3 for insulation requirements for existing buildings.
13. Private playground *equipment* including tree houses.
14. Removal and/or replacement of underground storage tanks that are subject to regulation by a state or federal agency.

Note: A Fire Department permit is required for removal, replacement and decommissioning of underground storage tanks.

15. Installation of dish and panel antennas 6.56 feet (2 m) or less in diameter or diagonal measurement.
16. Portable heating *appliances*, portable ventilating *equipment* and portable cooling units, if the total capacity of these portable *appliances* does not exceed 40 percent of the cumulative heating, cooling or ventilating requirements of a building or *dwelling unit* and does not exceed 3 kW or 10,000 Btu input.
17. Any closed system of steam, hot or chilled water *piping* within heating or cooling *equipment* regulated by this code.
18. Minor work or the replacement of any component part of a mechanical system that does not alter its original approval and complies with other applicable requirements of this code.
19. Water tanks not located in Environmentally Critical Areas that are supported directly on grade if the capacity is not greater than 5,000 gallons (18 925 L) the ratio of height to diameter or width is not greater than 2:1.

R105.3 Other permits required. Unless otherwise exempted by this or other pertinent codes, separate master use, plumbing, electrical, mechanical and other permits may be required for the above exempted items.

R105.4 Flood hazard areas. In addition to the permit required by this section, all work to be performed in areas of special flood hazard, as defined in Chapter 25.06 of the *Seattle Municipal Code* are subject to additional standards and requirements, including floodplain development approval or a Floodplain Development License, as set forth in Chapter 25.06, the Seattle Floodplain Development Ordinance.

R105.5 Application for permit. To obtain a permit, the applicant shall first file an application in a format determined by the *building official*. Every such application shall:

1. Identify and describe the work to be covered by the permit for which application is made.
2. Describe the land on which the proposed work is to be done by legal description, property address or similar description that will readily identify and definitely locate the proposed building or work.
3. Provide the contractor's business name, address, phone number and current contractor registration number (required if contractor has been selected).
4. Be accompanied by *construction documents*, including plans and other data required in Section R105.6.
5. State the valuation of any new building or structure or any addition, remodeling or *alteration* to an existing building, including cost breakdown between additions and *alterations*.
6. Be signed by the owner of the property or building, or the owner's authorized agent, who may be required to submit evidence to indicate such authority.
7. Give such other data and information as may be required by the *building official*, including, but not limited to, master use and shoreline permits and building identification plans.
8. State the name of the owner and contractor and the name, address and phone number of a contact person.
9. Substantially conform with applicable city law in effect on the date described in Section R101.3, as modified by any exception.
10. Applications that include a grading component shall include all information prescribed by the Grading Code and rules adopted thereunder, and all additional information required by the *building official* pursuant to the Grading Code and rules adopted thereunder.

R105.6 Submittal documents. Submittal documents consisting of *construction documents* and other data shall be submitted in two or more sets, or in a digital format where allowed by the building official, with each application for a *permit*. The *construction documents* shall be prepared by a registered *design professional* where required by the statutes of the *jurisdiction* in which the project is to be constructed. Computations, stress diagrams, shop and fabrication drawings and other data sufficient to show the adequacy of the plans shall be submitted when required by the *building official*. Where special conditions exist,

the *building official* is authorized to require additional *construction documents* to be prepared by a registered *design professional.*

Exception: The *building official* is authorized to waive the submission of *construction documents* and other data not required to be prepared by a registered *design professional* if it is found that the nature of the work applied for is such that reviewing of *construction documents* is not necessary to obtain compliance with this code.

R105.6.1 Preparation by registered design professionals. *Construction documents* for all work shall be prepared and designed by or under the direct supervision of an architect or structural engineer licensed to practice under the laws of the State of Washington. Each sheet of *construction documents* shall bear the seal and the signature of the registered *design professional* before the permit is issued.

Exceptions:

1. When authorized by the *building official, construction documents* need not be prepared by an engineer or architect licensed by the State of Washington for the following:
   1.1. Detached one- and two-family dwellings.
   1.2. New buildings or structures, and additions, *alterations* or repairs made to them of wood light-frame construction, if the value of construction, as determined by the *building official,* is less than $75,000.
   1.3. Nonstructural *alterations* and repairs if the value of construction, as determined by the *building official,* is less than $75,000, excluding the value of electrical and mechanical systems, fixtures, *equipment,* interior finish and millwork.
   1.4. Other work as specified in rules promulgated by the *building official.*
2. When authorized by the *building official, construction documents* for assembly line products or designed specialty structural products may be designed by a registered professional engineer.

Interpretation R105.6: Exception 1 does not include buildings with steel moment frames, or extensive or more complex concrete structures such as concrete frame, mild reinforced or post-tensioned floor slabs. These buildings are required to be designed by a licensed structural engineer.

R105.6.1.1 Design professional in responsible charge. The *building official* is authorized to require the owner to engage and designate on the building permit application a registered *design professional* who shall act as the registered *design professional* in responsible charge. If the circumstances require, the owner shall designate a substitute registered *design professional* in responsible charge who shall perform the duties required of the original registered *design professional* in responsible charge. The *building official* shall be notified in writing by the owner if the registered *design professional* in responsible charge is changed or is unable to continue to perform the duties. The registered *design professional* in responsible charge is responsible for reviewing and coordinating submittal documents prepared by others, including phased and deferred submittal items, for compatibility with the design of the building.

R105.6.2 Information required on construction documents. *Construction documents* shall include the following, as applicable:

1. A plot plan showing the width of streets, alleys, *yards* and courts.
2. The location (and/or location within a building), floor area, story, height and use defined by the Land Use Code of the proposed building and of every existing building on the property.
3. Where there are more than two buildings located on a property, a building identification plan identifying the location of each building on the property and identifying each building by a numbering system unrelated to address. Such plan is not required where a plan for the site is already on file and no new buildings are being added to the site.
4. Types of heating and air conditioning systems.
5. Architectural plans, including floor plans, elevations and door and finish schedules showing location of all doors, windows, mechanical *equipment,* shafts, pipes, vents and ducts.
6. Structural plans, including foundation plan and framing plans.
7. Cross-sections and construction details for both architectural and structural plans, including wall sections, foundation, floor and roof details, connections of structural members and types of construction material.
8. Topographic plans, including original and final contours, location of all buildings and structures on the site and, when required by the *building official,* adjacent to the site, and cubic yards of cut and fill.
9. If the *building official* has reason to believe that there may be an intrusion into required open areas or over the property line, a survey of the property prepared by a land surveyor licensed by the State of Washington is required for all new construction, and for additions or accessory buildings.

10. If any building or structure is to be erected or constructed on property abutting an unimproved or partially improved street or alley, the plans shall also include a profile showing the established or proposed grade of the street or alley, based upon information obtained from the Director of Transportation relating to the proposed finished elevations of the property and improvements thereon.

R105.6.3 Information on first sheet. The first or general note sheet of each set of plans shall specify the following, as applicable:

1. The building and street address of the work.
2. The name and address of the owner and person who prepared the plans.
3. Legal description of the property.
4. Type of occupancy of all parts of the building as defined in this code, including notation of fixed fire protection devices or systems.
5. Zoning classification of the property and existing and proposed uses of the structure(s) as defined in the *Land Use Code*.
6. Number of stories and *basements* as defined in this code.
7. Variances, conditional uses, special exceptions, including project numbers, approval and approval extension dates.

R105.6.4 Structural notes. Plans shall include applicable information including, but not limited to, the following:

1. Design loads: Snow load, live loads and lateral loads. If required by the *building official*, the structural notes for plans engineered to ASCE 7 shall include the factors of the base shear formula used in the design;
2. Foundations: Foundation investigations, allowable bearing pressure for spread footings, allowable load capacity of piles, lateral earth pressure;
3. Masonry: Type and strength of units, strength or proportions of mortar and grout, type and strength of reinforcement, method of testing, design strength;
4. Wood: Species or species groups, and grades of sawn lumber, glued-laminated lumber, plywood and assemblies, type of fasteners;
5. Concrete: Design strengths, mix designs, type and strength of reinforcing steel, welding of reinforcing steel, restrictions, if any; and
6. Steel and aluminum: Specification types, grades and strengths, welding electrode types and strengths.

In lieu of detailed structural notes, the *building official* may approve minor references on the plans to a specific section or part of this code or other ordinances or laws.

R105.6.5 Deferred submittals. Deferral of any submittal items shall have the prior approval of the *building official*. The *registered design professional in responsible charge* shall list *deferred submittals* on the *plans* for review by the *building official*.

Documents for *deferred submittal* items shall be submitted to the *registered design professional in responsible charge* who shall review them and forward them to the *building official* with a notation indicating that the *deferred submittal* documents have been reviewed and been found to be in general conformance to the design of the building. The *deferred submittal* items shall not be installed until the *deferred submittal* documents have been *approved* by the *building official*.

R105.6.6 Information for construction in flood hazard areas. For buildings and structures located in whole or in part in flood hazard areas identified in Table R301.2(1), *construction documents* shall also include:

1. Delineation of flood hazard areas, floodway boundaries, flood zones, and design flood elevations, as appropriate.
2. The elevation of the proposed lowest floor, including *basement;* and in areas of shallow flooding (AO Zones), the height of the proposed lowest floor, including *basement*, above the highest adjacent *grade*.
3. The elevation of the bottom of the lowest horizontal structural member in coastal high hazard areas (V Zone) and in Coastal A Zones where such zones are delineated on flood hazard maps identified in Table R301.2(1) or otherwise delineated by the *jurisdiction*.
4. If design flood elevations are not included on the community's Flood Insurance Rate Map (FIRM), the *building official* and the applicant shall obtain and reasonably utilize any design flood elevation and floodway data available from other sources.

R105.6.7 Construction and Demolition Waste: The information in Sections R105.6.7.1 and R105.6.7.2 shall be submitted for projects generating construction or demolition material for salvage, recycling or disposal:

Exception: Projects for which an emergency order or hazard correction order has been issued pursuant to Section R102.

R105.6.7.1 Application Submittal Requirements. The following information shall be provided at the time of application submittal for *building alterations* and the demolition of *existing buildings* having a work area greater than 750 square feet or a project value greater than $75,000:

1. A salvage assessment completed by an *approved agency* identifying building components having potential to be salvaged prior to building removal. The building owner is permitted to complete the assessment for building *alterations* that include some demolition.
2. A statement of compliance with the regulations of the Puget Sound Clean Air Agency regarding asbestos identification, notification, and abatement.

R105.6.7.2 Waste Diversion Report. A Waste Diversion Report shall be submitted within 60 days of final inspection approval. The Waste Diversion Report shall identify the weight or volume of project-generated construction waste and demolition material; the hauler of the material; and the receiving facility or location for each commodity. A signed affidavit from the receiving party and photo documentation shall be included for salvaged materials in which a tip receipt cannot be obtained.

R105.6.8 Clarity of plans. Plans shall be drawn to a clearly indicated and commonly accepted scale in a format determined by the *building official.*

R105.7 Application review. The *construction documents* shall be reviewed by the *building official*. Such *construction documents* may be reviewed by other departments of the City to check compliance with the laws and ordinances under their jurisdiction.

R105.7.1 Determination of completeness. Within 28 days after an application is filed, the *building official* shall notify the applicant in writing either that the application is complete or that it is not complete, and if not complete, what additional information is required to make it complete. Within 14 days after receiving the additional information, the *building official* shall notify the applicant in writing whether the application is now complete or what additional information is necessary. An application shall be deemed to be complete if the *building official* does not notify the applicant in writing by the deadlines in this section that the application is incomplete.

R105.7.2 Decision on application. Except as provided in Section R105.10, the *building official* shall approve, condition or deny the application within 120 days after the *building official* notifies the applicant that the application is complete.

To determine the number of days that have elapsed after the notification that the application is complete, the following periods shall be excluded:

1. All periods of time during which the applicant has been requested by the Director to correct plans, perform required studies, or provide additional required information, until the determination that the request has been satisfied. The period shall be calculated from the date the *building official* notifies the applicant of the need for additional information until the earlier of the date the *building official* determines whether the additional information satisfies the request for information or 14 days after the date the information has been provided to the *building official.*
2. If the *building official* determines that the information submitted by the applicant under item 1 of this subsection is insufficient, the *building official* shall notify the applicant of the deficiencies, and the procedures under item 1 of this subsection shall apply as if a new request for information had been made;
3. All extensions of time mutually agreed upon by the applicant and the *building official.*

If a project permit application is substantially revised by the applicant, the time period shall start from the date at which the revised project application is determined to be complete under Section R101.3.1.

R105.7.3 Determination of substantially improved or substantially damaged existing buildings in flood hazard areas. For applications for reconstruction, rehabilitation, *addition, alteration*, repair or other improvement of existing buildings or structures located in a flood hazard area identified in Table R301.2(1), the *building official* shall determine the value of the proposed work. For buildings that have sustained damage of any origin, the value of the proposed work shall include the cost to repair the building or structure to its predamaged condition, regardless of the actual repair work performed. If the *building official* finds that the value of proposed work equals or exceeds 50 percent of the market value of the building or structure before the damage occurred or the improvement starts, the proposed work constitutes a substantial improvement and the proposed work shall comply with Section R322.

Substantial improvements do not include:

1. Improvements to a building or structure that are required to correct existing health, sanitary or safety code violations identified by the *building official* and that are the minimum necessary to ensure safe living conditions, or
2. Any *alteration* of a landmark, provided that the *alteration* will not result in rescission of the landmark's landmark designation landmark.

R105.8 Issuance of permit.

R105.8.1 Subject to Section R105.8.2, the *building official* shall issue a permit to the applicant if the *building official* finds the following:

1. The work described in the *construction documents* conforms to the requirements of this code and other pertinent laws, ordinances and regulations and with all conditions imposed under any of them,
2. The fees specified in the Fee Subtitle have been paid, and
3. The applicant has complied with all requirements to be performed prior to issuance of a permit for the work under other pertinent laws, ordinances or regulations or included in a master use permit, or otherwise imposed by the *building official.*

When the permit is issued, the applicant or the applicant's authorized agent becomes the permit holder.

R105.8.2 The *building official* shall not issue a permit if the *building official* has determined that the property owner violated subsection 22.210.136.A of the Seattle Municipal Code and has not obtained any required tenant relocation license.

R105.8.3 Grading permits. The grading component of the building permit is the portion of the building permit that authorizes work that is subject to the requirements of the Grading Code. That component constitutes a grading permit.

R105.8.4 Permit conditions. The *building official* may impose on a permit any conditions authorized by this code or other pertinent ordinances or regulations, including but not limited to the Grading Code, the Stormwater Code, Regulations for Environmentally Critical Areas, and rules adopted pursuant to those codes. The *building official* may condition a permit in order to reduce the risks associated with development, construction, ownership and occupancy including, but not limited to risks in potential slide areas.

R105.8.5 Denial of permits. The *building official* may deny a permit if the *building official* determines that:

1. The risks cannot be reduced to an acceptable level,
2. The proposed project or *construction documents* do not conform to the requirements of this code or other pertinent laws, ordinances or regulations, to requirements included in the Master Use Permit or to requirements otherwise imposed by the *building official* or other City departments, or to requirements otherwise imposed by the *building official* or other City departments, or
3. The applicant has failed to comply with any requirement or condition imposed pursuant to the authority described in Section R105.8.4.

R105.8.6 Compliance with approved construction documents. When the *building official* issues a permit, the *building official* shall endorse the permit in writing or in electronic format and stamp the plans APPROVED. Such *approved* plans and permit shall not be changed, modified or altered without authorization from the *building official,* and all work shall be done in accordance with the *approved construction documents* and permit except as authorized by the *building official* during a field inspection to correct errors or omissions, or as authorized by Section R105.9.

R105.9 Revisions to the permit. When changes to the *approved* work are made during construction, approval of the *building official* shall be obtained prior to execution. The building inspector may approve minor changes to the *construction documents* for work not reducing the structural strength or fire and life safety of the structure. The building inspector shall determine if it is necessary to revise the *approved construction documents*. No changes that are subject to special inspection shall be made during construction unless *approved* by the *building official.* If revised plans are required, changes shall be submitted to and *approved* by the *building official,* accompanied by fees specified in the Fee Subtitle, prior to occupancy. All changes shall conform to the requirements of this code and other pertinent laws and ordinances and other issued permits.

R105.10 Cancellation of permit applications. Applications may be cancelled if no permit is issued by the earlier of the following: (1) twelve months following the date of application; or (2) sixty days from the date of written notice that the permit is ready to issue. After cancellation, *construction documents* submitted for review may be returned to the applicant or destroyed by the *building official.*

The *building official* will notify the applicant in writing at least 30 days before the application is cancelled. The notice shall specify a date by which a request for extension must be submitted in order to avoid cancellation. The date shall be at least two weeks prior to the date on which the application will be cancelled.

R105.10.1 Extensions prior to permit issuance. At the discretion of the *building official,* applications for projects that require more than 12 months to review and approve may be extended for a period that provides reasonable time to complete the review and approval, but in no case longer than 24 months from the date of the original application. No application may be extended more than once. After cancellation, the applicant shall submit a new application and pay a new fee to restart the permit process.

Notwithstanding other provisions of this code, an application may be extended where issuance of the permit is delayed by litigation, preparation of environmental impact statements, appeals, strikes or other causes related to the application that are beyond the applicant's control, or while the applicant is making progress toward issuance of a master use permit.

R105.11 Retention of plans. One set of *approved* plans, which may be on microfilm or in electronic format, shall be retained by the *building official.* One set of *approved* plans shall be returned to the applicant and shall be kept at the site of the building or work for use by inspection personnel at all times during which the work authorized is in progress.

R105.12 Validity of permit. The issuance or granting of a permit or approval of *construction documents* shall:

1. Not be construed to be a permit for, or an approval of, any violation of any of the provisions of this code or other pertinent laws and ordinances;
2. Not prevent the *building official* from requiring the correction of errors in the *construction documents* or from preventing building operations being carried on thereunder when in violation of this code or of other pertinent laws and ordinances of the City;
3. Not prevent the *building official* from requiring correction of conditions found to be in violation of this code or other pertinent laws and ordinances of the City; or
4. Not be construed to extend the period of time for which any such permit is issued or otherwise affect any period of time for compliance specified in any notice or order issued by the *building official* or other administrative authority requiring the correction of any such conditions.

R105.13 Expiration of permits. Authority to do the work authorized by a permit expires 18 months from the date of issuance. An *approved* renewal extends the life of the permit for an additional 18 months from the prior expiration date. An *approved* reestablishment extends the life of the permit for 18 months from the date the permit expired.

Exceptions:

1. Initial permits for major construction projects that require more than 18 months to complete may be issued for a period that provides reasonable time to complete the work, according to an *approved* construction schedule. The *building official* may authorize a permit expiration date not to exceed three years from the date of issuance, except when there is an associated Shoreline Substantial Development permit in which case the *building official* may authorize an expiration date not to exceed the life of the Shoreline permit.
2. The *building official* may issue permits which expire in less than 18 months if the *building official* determines a shorter period is appropriate to complete the work.

This section is subject to the limitations in *Seattle Municipal Code* Section 22.800.100, Seattle Stormwater Code.

R105.14 Renewal of permits. Permits may be renewed and renewed permits may be further renewed by the *building official* if the following conditions are met:

1. Application for renewal is made within the 30 day period immediately preceding the date of expiration of the permit; and
2. If the project has had an associated discretionary Land Use review, the land use approval has not expired; and
3. If an application for renewal is made more than 18 months after the date of mandatory compliance with a new or revised edition of the *Seattle Residential Code*, the permit shall not be renewed unless:
   - 3.1. The *building official* determines that the permit complies, or is modified to comply, with the Seattle Residential, Energy, Stormwater, Side Sewer and Grading codes in effect on the date of application for renewal; or
   - 3.2. The work authorized by the permit is substantially underway and progressing at a rate *approved* by the *building official.* "Substantially underway" means that normally required building inspections have been *approved* for work such as foundations, framing, mechanical, insulation and finish work that is being completed on a continuing basis; or
   - 3.3. Commencement or completion of the work authorized by the permit is delayed by litigation, appeals, strikes or other extraordinary circumstances related to the work authorized by the permit beyond the permit holder's control, subject to approval by the *building official;* and
4. If an application for renewal is submitted on or after January 1, 2017, the permit shall not be renewed unless: (a) the *building official* determines that the permit complies, or is modified to comply, with the Seattle Stormwater Code in effect on the date of application for renewal; or (b) construction has started. For purposes of this provision, "started construction" means the site work associated with and directly related to the *approved* project has begun. For example, grading the project site to final grade or utility installation constitutes the start of construction; simply clearing the project site does not.

R105.15 Reestablishment of expired permits. A new permit is required to complete work if a permit has expired and was not renewed.

Exception: A permit that expired less than one year prior to the date of a request for reestablishment may be reestablished upon approval of the *building official* if it complies with Section R105.14, Items 2, 3 and 4 above. Once re-established the permit will not be considered to have expired. The new expiration date of a reestablished permit shall be determined in accordance with Section R105.13.

R105.16 Revocation of building permits. Whenever the *building official* determines there are grounds for revoking a permit, the *building official* may issue a notice of revocation. The notice of revocation shall identify the reason for the proposed revoca-

tion, including but not limited to the violations, the conditions violated and any alleged false or misleading information provided.

R105.16.1 Standards for revocation. The *building official* may revoke a permit if:

1. The code or the building permit has been or is being violated and issuance of a notice of violation or stop work order has been or would be ineffective to secure compliance because of circumstances related to the violation; or
2. The permit was obtained with false or misleading information.

R105.16.2 Service of notice of revocation. The notice of revocation shall be served upon the owner, agent or other responsible person by personal service or regular first class mail addressed to the last known address of such person or if no address is available after reasonable inquiry, the notice may be posted in a conspicuous place on the premises. The notice may also be posted if served by personal service or first class mail.

R105.16.3 Effective date of revocation. The *building official* shall identify in the notice of revocation a date certain on which the revocation will take effect. This date may be stayed pending complete review by the *building official* pursuant to Section R105.12.4.

R105.16.4 Review by the building official for notice of revocation. Any person aggrieved by a notice of revocation may obtain a review by making a request in writing to the *building official* within three business days of the date of service of the notice of revocation. Any person affected by the notice of revocation may submit additional information to the *building official* for consideration as part of the review at any time prior to the review.

R105.16.4.1 Review procedure. The review will be made by a representative of the *building official* who will review all additional information received and may also request a site visit. After the review, the *building official* may:

1. Sustain the notice of revocation and affirm or modify the date the revocation will take effect;
2. Withdraw the notice of revocation;
3. Modify the notice of revocation and affirm or modify the date the revocation will take effect; or
4. Continue the review to a date certain.

R105.16.4.2 Order of revocation of permit. The *building official* shall issue an order containing the decision within ten days after the review is completed and shall cause the same to be sent by regular first class mail to the person or persons requesting the review, any other person on whom the notice of revocation was served and any other person who requested a copy before issuance of the order. The order of the *building official* is the final order of the City, and the City and all parties shall be bound by the order.

SECTION R106
INSPECTIONS

R106.1 General. All construction or work for which a permit is required is subject to inspection by the *building official*, and certain types of construction shall have special inspections by registered special inspectors as specified in the *Seattle Building Code* Chapter 17.

R106.2 Surveys. A survey of the *lot* may be required by the *building official* to verify compliance of the structure with *approved construction documents.*

R106.3 Inspection requests. The owner of the property or the owner's authorized agent, or the person designated by the owner or agent to do the work authorized by a permit shall notify the *building official* that work requiring inspection as specified in this section is ready for inspection.

R106.4 Access for inspection. The permit holder and the person requesting any inspections required by this code shall provide access to and means for proper inspection of such work, including safety *equipment* required by the Washington Industrial Safety and Health Agency. The work shall remain accessible and exposed for inspection purposes until *approved* by the *building official.* Neither the *building official* nor the City is liable for expense entailed in the required removal or replacement of any material to allow inspection.

R106.5 Inspection record. Work requiring a permit shall not be commenced until the permit holder or the permit holder's agent has posted an inspection record in a conspicuous place on the premises and in a position that allows the *building official* to conveniently make the required entries regarding inspection of the work. This record shall be maintained in such a position by the permit holder or the permit holder's agent until final approval has been granted by the *building official.*

R106.6 Approvals required. No work shall be done on any part of the building or structure beyond the point indicated in each successive inspection without first obtaining the written approval of the *building official.* Written approval shall be given only after an inspection has been made of each successive step in the construction as indicated by each of the inspections required in Section R106.8. There shall be a final inspection and approval of all buildings when they are completed and ready for occupancy.

R106.6.1 Effect of approval. Approval as a result of an inspection is not approval of any violation of the provisions of this code or of other pertinent laws and ordinances of the City. Inspections presuming to give authority to violate or cancel the provisions of this code or of other pertinent laws and ordinances of the City are not valid.

R106.7 Concealment of work. No required reinforcing steel or structural framework of any part of a building or structure shall be covered or concealed in any manner whatsoever without first obtaining the approval of the *building official.*

Exception: Modular homes and commercial coaches identified by State of Washington stickers specified in Section 106.13.4 of the *International Building Code* and placed upon a permanent foundation *approved* and inspected by the *building official.*

R106.8 Required inspections. The *building official,* upon notification by the permit holder or the permit holder's agent, of the property address and permit number, shall make the following inspections and shall either approve that portion of the construction as completed or shall notify the permit holder or the permit holder's agent if the construction fails to comply with the law.

R106.8.1 First ground disturbance inspection. To be made prior to beginning land-disturbing activity, and following installation of erosion control measures and any required fencing that may restrict land disturbance in steep slope or other buffers as defined in chapter 25.09 of the *Seattle Municipal Code.*

Note: The purpose of the site inspection is to verify the erosion control method, location and proper installation. *Approved* drainage plan requirements and site plan conditions will also be verified, including buffer delineations.

R106.8.2 Foundation inspection. To be made after trenches are excavated and forms erected and when all materials for the foundation are delivered on the job. Where concrete from a central mixing plant (commonly termed "ready mix") is to be used, materials need not be on the job.

R106.8.3 Concrete slab or under-floor inspection. To be made after all in-slab or under-floor building service *equipment,* conduit, *piping* accessories and other ancillary *equipment* items are in place but before any concrete is poured or floor sheathing installed, including the subfloor.

R106.8.4 Floodplain inspections. For construction in flood hazard areas identified in Table R301.2(1), upon placement of the lowest floor, including *basement,* and prior to further vertical construction, the applicant shall submit documentation, prepared and sealed by a registered *design professional,* showing the elevation of the lowest floor, including *basement,* as required in Section R322.

R106.8.5 Frame inspection. To be made after the roof, all framing, fireblocking and bracing are in place and all pipes, chimneys and vents are complete and the rough electrical, plumbing and heating wires, pipes and ducts are *approved.*

R106.8.6 Insulation inspection. To be made after all insulation and vapor barriers are in place but before any gypsum board or plaster is applied.

R106.8.7 Lath and/or gypsum board inspection. For shear walls, to be made after lathing and/or gypsum board, interior and exterior, is in place, but before any plastering is applied or before gypsum board joints and fasteners are taped and finished.

R106.8.8 Final site inspection. To be made after all grading is complete, and all permanent erosion controls, stormwater facilities and stormwater best management practices have been installed.

Exception: A final site inspection is not required for projects with less than 750 square feet of land disturbing activity.

R106.8.9 Final inspection. To be made after finish grading and the building is completed and before occupancy.

R106.8.9.1 Elevation documentation. If located in a flood hazard area, the documentation of elevations required in Section R322.1.10 shall be submitted to the *building official* prior to the final inspection.

R106.9 Special inspection. Special inspection shall be provided in accordance with *International Building Code* Chapter 17.

R106.10 Other inspections. In addition to the inspections specified above, the *building official* may make or require any other inspections of any construction work or site work to ascertain compliance with the provisions of this code and other pertinent laws and ordinances that are enforced by the *building official.*

R106.11 Special investigation. If work that requires a permit or approval is commenced or performed prior to making formal application and receiving the *building official's* permission to proceed, the *building official* may make a special investigation inspection before a permit is issued for such work. Where a special investigation is made, a special investigation fee may be assessed in accordance with the Fee Subtitle.

R106.12 Reinspections. The *building official* may require a reinspection if work for which an inspection is called is not complete, required corrections are not made, the inspection record is not properly posted on the work site, the *approved* plans are not readily available to the inspector, access is not provided on the date for which inspection is requested, or if deviations from *construction documents* that require the approval of the *building official* have been made without proper approval, or as otherwise required by the *building official.*

R106.12.1 Compliance with Section R107.3. For the purpose of determining compliance with Section R107.3, Maintenance, the *building official* or the fire chief may cause a structure to be reinspected.

R106.12.2 Reinspection fee. The *building official* may assess a reinspection fee as set forth in the Fee Subtitle for any action for which reinspection is required. In instances where reinspection fees have been assessed, no additional inspection of the work will be performed until the required fees have been paid.

R106.13 Approval for occupancy. Except for *alterations* and additions, no building or structure subject to this code shall be occupied until *approved* for occupancy after final inspection.

R106.13.1 Effect of Final inspection. Final inspection is not an approval of any violation of the provisions of this code or other pertinent laws and ordinances of the City. Certificates presuming to give authority to violate or cancel the provisions of this code or of other pertinent laws and ordinances of the City are not valid.

SECTION R107
EXISTING STRUCTURES AND EQUIPMENT

R107.1 General. Buildings in existence at the time of the passage of this code that were legally constructed and occupied in accordance with the provisions of a prior code may continue their existing use, if such use is not unsafe. Mechanical systems lawful at the time of the adoption of this code may continue and may be maintained or repaired, converted to another type of fuel or have components replaced if it is done in accordance with the basic original design and location and no hazard to life, health or property is created by such mechanical system.

R107.2 Establishing existing uses for the record. In order to establish an existing use for the record, the building shall comply with the fire and life safety requirements of this code or the code effective at the time the building was constructed. If the existing use is other than that for which the building was constructed, the building shall comply with this code or the code effective at the time the existing use was legally established.

R107.3 Maintenance. All buildings and structures, and all parts thereof, shall be maintained in a safe and sanitary condition. All mechanical systems, materials, *equipment* and appurtenances and all parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe and hazard-free condition. All devices and safeguards which are or were required by a code in effect when the building or structure was erected, altered or repaired shall be maintained in conformance with the code edition under which installed.

Exception: The *building official* is authorized to modify the requirements of this subsection where all or a portion of a building is unoccupied, closed off and reasonably secure from unlawful entry.

R107.3.1 Reinspection for maintenance. To determine compliance with this subsection, the *building official* may cause a mechanical system or *equipment* to be reinspected.

R107.3.2 Responsibility for maintenance. The owner or the owner's designated agent is responsible for maintenance of buildings, structures, mechanical systems, materials, *equipment*, devices, safeguards and appurtenances. It is a violation to fail to maintain such buildings, structures, mechanical systems, materials, *equipment*, devices, safeguards and appurtenances or to fail to immediately comply with any lawful notice or order of the *building official.*

Exception: Occupants of dwellings are responsible for the maintenance of smoke alarms required by Section R314 and carbon monoxide alarms required by Section R315.

R107.4 Unsafe building appendages. Parapet walls, cornices, chimneys and other appendages or structural members that are supported by, attached to, or a part of a building and that are in a deteriorated condition or are otherwise unable to sustain the design loads specified in this code, are hereby designated as unsafe building appendages. All such unsafe building appendages are public nuisances and shall be abated in accordance with Section R102.

R107.5 Additions and alterations. Buildings and structures to which additions and *alterations* are made shall comply with all the requirements of this code for new facilities except as specifically provided in this section. *Alterations* shall be such that the *existing building* or structure is no less conforming to the provisions of this code after the *alteration* than the *existing building* or structure was before the *alteration*.

See also applicable provisions of the *International Energy Conservation Code*. Any building or addition that is not covered by or within the scope of this code as provided in Section R101.2 shall be designed to the provisions of the *International Building Code*.

Exceptions:

1. An addition may be made to an existing nonconforming building if the following conditions are met:
   1.1. A fire wall, constructed in compliance with *International Building Code* Section 706, separates the addition and the existing structure;
   1.2. The existing building is not made more nonconforming; and

1.3. The addition conforms to this code.

2. Additions with less than 500 square feet of conditioned floor area are exempt from the requirements for whole house ventilation systems, Section M1507.

R107.5.1 When allowed. Additions and *alterations* may be made to any existing building or structure without requiring the existing building or structure to comply with all the requirements of this code, if the addition or *alteration* conforms to the standards required for a new building or structure and complies with Section R107.5. Additions, *alterations* or renovations may be made to any mechanical system without requiring the existing mechanical system to comply with all the requirements of this code, if the addition, *alteration* or renovation conforms to the standards required for a new mechanical system. Additions, *alterations* or renovations shall not cause an existing system to become unsafe, unhealthy or overloaded. Minor additions, *alterations* and renovations to existing mechanical systems may be installed in accordance with the law in effect at the time the original installation was made, if *approved* by the *building official.*

R107.5.2 Impracticality. In cases where compliance with the requirements of this code is impractical, the applicant may arrange a presubmittal conference with the design team and the *building official.* The applicant shall identify alternate design solutions and modifications and demonstrate conformance to Section R104.4 or R104.5. The *building official* is authorized to waive specific requirements in this code that the *building official* determines to be impractical.

R107.5.3 Compliance with retroactive ordinances. *Alterations* and repairs to existing buildings that are being made in response to a notice or order requiring compliance with the *Housing and Building Maintenance Code*, Subtitle II, Title 22 of the *Seattle Municipal Code,* the *Fire Code*, Subtitle VI, Title 22 of the *Seattle Municipal Code,* or other ordinances applicable to existing buildings, shall be permitted to be made in accordance with the standards contained in those ordinances rather than the standards for new buildings contained in this code. If standards are not specified in those ordinances, such *alterations* or repairs shall conform to the requirements of this chapter.

R107.5.4 Nonstructural alterations. *Alterations* that are nonstructural and that do not affect any member or part of the building or structure required to be fire resistant may be made with the same materials of which the building or structure is constructed, provided that no change is permitted that increases its hazard.

R107.5.5 Maintenance of structural stability. If *approved* by the *building official,* minor structural *alterations* necessary to maintain the structural stability of the building may be made with the same material of which the building or structure is constructed.

R107.6 Repairs. Repairs to existing structures or *equipment* shall comply with the International Existing Buildings Code.

Exception: *Repair* of buildings with *damage ratios* of 60 percent or more shall comply with Section R107.9.

R107.7 Landmarks—Historic buildings and structures. The *building official* may modify the specific requirements of this code as it applies to landmarks, and require in lieu thereof alternate requirements that, in the opinion of the *building official,* will result in a reasonable degree of safety to the public and the occupants of those buildings.

Exception: *Repair* of buildings with *damage ratios* of 60 percent or more shall comply with Section R107.9.

R107.8 Unreinforced masonry chimneys. If an unreinforced *masonry chimney* is altered or if the building in which such a chimney is located undergoes substantial *alteration* as defined in Section R107.9.1, the chimney shall be altered to conform to rules promulgated by the *building official.*

R107.9 Substantial alterations or repairs. Any building or structure to which substantial *alterations* or repairs are made shall conform to the requirements of this Section and Sections R310 (emergency escape and rescue openings), R311 (means of egress), R314 (smoke alarms), R315 (carbon monoxide alarms) and R302.2 through R302.4 (*dwelling unit* separation).

R107.9.1 Definition. For the purpose of this section, substantial *alterations* or repairs may mean any one of the following, as determined by the *building official:*

1. Repair of buildings with *damage ratios* of 60 percent or more.
2. Remodeling or additions that substantially extend the useful physical and/or economic life of the building or a significant portion of the building.
3. Change to a use within the scope of this code from a use not within the scope of this code.
4. Change from an *accessory structure* to any other use within the scope of this code.
5. Change from a detached one- or two-family dwelling to a townhouse.
6. Change to *adult family home* or family child day care home from any other use.

R107.9.2 Seismic regulations. Buildings or structures to which substantial *alterations* or repairs are made shall comply with Sections R301.1.3 or Sections R403.1.6, R602.10 and R602.11. In addition, the *building official* may require testing of existing materials, at applicant or property owner's expense, if there is insufficient evidence of structural strength or integrity of the building or structure.

Exception: In lieu of compliance with the seismic provisions of Sections R403.1.6, R602.10 and R602.11, if *approved* by the *building official*, the applicant may evaluate and strengthen portions of the building lateral support structure, such as foundations and cripple walls.

R107.9.3 Other structural work. All other structural work shall comply with the requirements of Chapters 3, 4, 5, 6, 8 and 10 of this code.

R107.10 Change of use. If the use of a building or portion thereof is changed, any elements of the *dwelling unit* envelope that are altered shall comply with the sound transmission control requirements of Section R331. If the use of a building or portion thereof is changed to *adult family home* or to *family home child care*, the building shall comply with the applicable provisions of Section R327 or R328.

R107.11 Moved buildings. Residential buildings or structures moved into or within the City are not required to comply with the requirements of this code if the original use classification of the building or structure is not changed. Compliance with the requirements of this chapter is required if the moved residential buildings or structures undergo substantial *alteration* as defined in R107.9.1. Work performed on new and existing foundations shall comply with all of the requirements of this code for new construction.

R107.12 Rat abatement for demolished buildings. All applicants for a demolition permit shall initiate a rat abatement program on the project site at least 15 days prior to the start of demolition or any clearing or grading activity on the demolition site.

R107.12.1 Duration of rat abatement program. The rat abatement program must continue at least until demolition begins. No demolition or clearing or grading on the demolition site shall begin until the rat abatement program is complete unless approved by the *building official*. The rat abatement program may be terminated or waived by the building official when supported by a written recommendation of a licensed pest control agent.

R107.12.2 Requirements of rat abatement program. The rat abatement program shall be approved by a qualified pest control agent and shall comply with the Seattle-King County Public Health Department guidelines and recommendations for rat baiting. The use of any pesticide shall comply with WAC 16-228-1380. The *building official* may require additional deterrent measures on recommendation of the Seattle-King County Public Health Department.

107.12.3 Demolition permit. The *building official* shall not issue any demolition permit until the applicant has provided a copy of the rat abatement program and a declaration that the requirements of Section R107.12 have been or will be complied with prior to the start of demolition.

SECTION R108
FEES

R108.1 Fees. A fee for each permit and for other activities related to the enforcement of this code shall be paid as set forth in the Fee Subtitle.

SECTION R109
INTERPRETATION

R109.1 Defined terms. Selected words and terms defined in Chapter 2 are italicized where they appear in code text. Defined terms added or amended by The City of Seattle may also appear in italics. When defined terms are not italicized, consider the context to judge applicability of the definition in Chapter 2.

Part II—Definitions

CHAPTER 2

DEFINITIONS

User notes:

About this chapter: *Codes, by their very nature, are technical documents. Every word, term and punctuation mark can add to or change the meaning of a technical requirement. It is necessary to maintain a consensus on the specific meaning of each term contained in the code. Chapter 2 performs this function by stating clearly what specific terms mean for the purpose of the code.*

Code development reminder: *Code change proposals to definitions in this chapter preceded by a bracketed letter are considered by the IRC—Building Code Development Committee [RB], the IRC—Mechanical/Plumbing Code Development Committee [MP] or the IECC—Residential Code Development Committee [RE] during the Group B (2019) Code Development cycle. See page iv for explanation.*

SECTION R201
GENERAL

R201.1 Scope. Unless otherwise expressly stated, the following words and terms shall, for the purposes of this code, have the meanings indicated in this chapter.

R201.2 Interchangeability. Words used in the present tense include the future; words in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

R201.3 Terms defined in other codes. Where terms are not defined in this code such terms shall have the meanings ascribed in other code publications of the International Code Council.

R201.4 Terms not defined. Where terms are not defined through the methods authorized by this section, such terms shall have ordinarily accepted meanings such as the context implies.

[S] R201.5 References to other codes. Whenever an International, National or Uniform Code is referenced in this code, it shall mean the Seattle edition of that code, including any local amendments. References to the "Building Code," "Fire Code," "Mechanical Code" and "Plumbing Code" mean the Seattle editions of those codes.

SECTION R202
DEFINITIONS

[S][RE] ABOVE-GRADE WALL. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] ACCESS (TO). That which enables a device, an appliance or equipment to be reached by ready access or by a means that first requires the removal or movement of a panel, door or similar obstruction.

[S][RE] ACCESSIBLE. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] ACCESSORY STRUCTURE. A structure that is accessory to and incidental to that of the *dwelling*(*s*) and that is located on the same *lot*.

[S][RB] ADDITION. An extension or increase in floor area, number of stories or height of a building or structure. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] ADHERED STONE OR MASONRY VENEER. Stone or masonry veneer secured and supported through the adhesion of an *approved* bonding material applied to an *approved* backing.

[W] ADULT FAMILY HOME. A *dwelling*, licensed by the State of Washington Department of Social and Health Services, in which a person or persons provide personal care, special care, room and board to more than one but not more than six adults who are not related by blood or marriage to the person or persons providing the services. An existing adult family home may provide services to up to eight adults upon approval from the Department of Social and Health Services in accordance with RCW 70.128.066.

[MP] AIR ADMITTANCE VALVE. A one-way valve designed to allow air into the plumbing drainage system where a negative pressure develops in the piping. This device shall close by gravity and seal the terminal under conditions of zero differential pressure (no flow conditions) and under positive internal pressure.

[S][RE] AIR BARRIER. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[MP] AIR BREAK (DRAINAGE SYSTEM). An arrangement where a discharge pipe from a fixture, *appliance* or device drains indirectly into a receptor below the flood-level rim of the receptor and above the trap seal.

[MP] AIR CIRCULATION, FORCED. A means of providing space conditioning utilizing movement of air through ducts or plenums by mechanical means.

[MP] AIR-CONDITIONING SYSTEM. A system that consists of heat exchangers, blowers, filters, supply, exhaust and return-air systems, and shall include any apparatus installed in connection therewith.

[MP] AIR GAP, DRAINAGE SYSTEM. The unobstructed vertical distance through free atmosphere between the outlet of a waste pipe and the flood-level rim of the fixture or receptor into which it is discharging.

[MP] AIR GAP, WATER-DISTRIBUTION SYSTEM. The unobstructed vertical distance through free atmosphere between the lowest opening from a water supply discharge to the flood-level rim of a plumbing fixture.

[S][RB] AIR-IMPERMEABLE INSULATION. An insulation having an air permanence equal to or less than 0.02 L/s-m^2 at 75 Pa pressure differential as tested in accordance with ASTM E2178 or E283. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[S][RB] ALTERATION. Any construction, retrofit or renovation to an existing structure other than repair or addition that requires a permit. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] ALTERNATING TREAD DEVICE. A device that has a series of steps between 50 and 70 degrees (0.87 and 1.22 rad) from horizontal, usually attached to a center support rail in an alternating manner so that the user does not have both feet on the same level at the same time.

[RB] ANCHORED STONE OR MASONRY VENEER. Stone or masonry veneer secured with *approved* mechanical fasteners to an *approved* backing.

[MP] ANCHORS. See “Supports.”

[MP] ANTISIPHON. A term applied to valves or mechanical devices that eliminate siphonage.

[MP] APPLIANCE. A device or apparatus that is manufactured and designed to utilize energy and for which this code provides specific requirements.

[RB] APPROVED. Acceptable to the *building official*.

[S][RB] APPROVED AGENCY. An established and recognized agency that is regularly engaged in conducting tests, furnishing inspection services or furnishing product certification, and has been *approved* by the building official. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[MP] APPROVED SOURCE. An independent person, firm or corporation, *approved* by the *building official*, who is competent and experienced in the application of engineering principles to materials, methods or systems analyses.

[RB] ASPECT RATIO. The ratio of longest to shortest perpendicular dimensions, or for wall sections, the ratio of height to length.

[RB] ATTIC. The unfinished space between the ceiling assembly and the roof assembly.

[**RB] ATTIC, HABITABLE.** A finished or unfinished *habitable space* within an *attic*.

> **Interpretation:** This definition does not include dormers, but may include gable ends. Knee walls are inside the structural envelope.

[S][RE] AUTOMATIC. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[MP] BACKFLOW, DRAINAGE. A reversal of flow in the drainage system.

[MP] BACKFLOW PREVENTER. A backflow prevention assembly, a backflow prevention device or other means or method to prevent backflow into the potable water supply.

[MP] BACKFLOW PREVENTER, REDUCED-PRESSURE-ZONE TYPE. A backflow-prevention device consisting of two independently acting check valves, internally force loaded to a normally closed position and separated by an intermediate chamber (or zone) in which there is an automatic relief means of venting to atmosphere internally loaded to a normally open position between two tightly closing shutoff valves and with means for testing for tightness of the checks and opening of relief means.

[MP] BACKFLOW, WATER DISTRIBUTION. The flow of water or other liquids into the potable water-supply piping from any sources other than its intended source. Backsiphonage is one type of backflow.

[MP] BACKPRESSURE. Pressure created by any means in the water distribution system that by being in excess of the pressure in the water supply mains causes a potential backflow condition.

[MP] BACKPRESSURE, LOW HEAD. A pressure less than or equal to 4.33 psi (29.88 kPa) or the pressure exerted by a 10-foot (3048 mm) column of water.

[MP] BACKSIPHONAGE. The flowing back of used or contaminated water from piping into a potable water-supply pipe due to a negative pressure in such pipe.

[MP] BACKWATER VALVE. A device installed in a drain or pipe to prevent backflow of sewage.

[W] BALANCED WHOLE HOUSE VENTILATION. Balanced whole house ventilation is defined as any combination of concurrently operating residential unit mechanical exhaust and mechanical supply whereby the total mechanical exhaust airflow rate is within 10 percent or 5 cfm, whichever is greater, of the total mechanical supply airflow rate. Intermittent dryer exhaust, intermittent range hood exhaust, and intermittent toilet room exhaust airflow rates above the residential dwelling or sleeping unit minimum ventilation rate are exempt from the balanced airflow calculation.

[RB] BASEMENT. A *story* that is not a *story above grade plane*. (see "Story above grade plane").

[S][RE] BASEMENT WALL. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] BASIC WIND SPEED. Three-second gust speed at 33 feet (10 058 mm) above the ground in Exposure C (see Section R301.2.1) as given in Figure R301.2(5)A.

[MP] BATHROOM GROUP. A group of fixtures, including or excluding a bidet, consisting of a water closet, lavatory, and bathtub or shower. Such fixtures are located together on the same floor level.

[W] ((~~[RB] BATTERY SYSTEM, STATIONARY STORAGE.~~ ~~A rechargeable energy storage system consisting of electrochemical storage batteries, battery chargers, controls and associated electrical *equipment* designed to provide electrical power to a building. The system is typically used to provide standby or emergency power, an uninterruptable power supply, load shedding, load sharing or similar capabilities.~~))

[MP] BEND. A drainage fitting, designed to provide a change in direction of a drain pipe of less than the angle specified by the amount necessary to establish the desired slope of the line (see "Elbow" and "Sweep").

[S][MP] BOILER. ((~~A self-contained *appliance* from which hot water is circulated for heating purposes and then returned to the boiler, and that operates at water pressures not exceeding 160 pounds per square inch gage (psig) (1102 kPa gauge) and at water temperatures not exceeding 250°F (121°C).~~)) A closed vessel in which water is heated, steam is generated, steam is superheated, or any combination thereof, under pressure or vacuum by the direct application of heat. The term "boiler" shall also include fired units for heating or vaporizing liquids other than water where these systems are complete within themselves.

[RB] BOND BEAM. A horizontal grouted element within masonry in which reinforcement is embedded.

[RB] BRACED WALL LINE. A straight line through the building plan that represents the location of the lateral resistance provided by the wall bracing.

[RB] BRACED WALL LINE, CONTINUOUSLY SHEATHED. A *braced wall line* with structural sheathing applied to all sheathable surfaces including the areas above and below openings.

[RB] BRACED WALL PANEL. A full-height section of wall constructed to resist in-plane shear loads through interaction of framing members, sheathing material and anchors. The panel's length meets the requirements of its particular bracing method, and contributes toward the total amount of bracing required along its *braced wall line* in accordance with Section R602.10.1.

[MP] BRANCH. Any part of the piping system other than a riser, main or stack.

[MP] BRANCH, FIXTURE. See "Fixture branch, drainage."

[MP] BRANCH, HORIZONTAL. See "Horizontal branch, drainage."

[MP] BRANCH INTERVAL. A vertical measurement of distance, 8 feet (2438 mm) or more in *developed length*, between the connections of horizontal branches to a drainage stack. Measurements are taken down the stack from the highest horizontal branch connection.

[MP] BRANCH, MAIN. A water-distribution pipe that extends horizontally off a main or riser to convey water to branches or fixture groups.

[MP] BRANCH, VENT. A vent connecting two or more individual vents with a vent stack or stack vent.

[MP] BTU/H. The *listed* maximum capacity of an *appliance*, absorption unit or burner expressed in British thermal units input per hour.

[W][S][RB] BUILDING. Any one- or two-family dwelling or townhouse, or portion thereof, ((~~including *townhouses*,~~)) used or intended to be used for human habitation, for living, sleeping, cooking or eating purposes, or any combination thereof, or any *accessory structure*. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[MP] BUILDING DRAIN. The lowest piping that collects the discharge from all other drainage piping inside the house and extends 30 inches (762 mm) in *developed length* of pipe, beyond the *exterior walls* and conveys the drainage to the *building sewer*.

[W][RB] BUILDING, EXISTING. ((~~Existing building is a~~)) A building or structure erected prior to the adoption of this code, or one ((~~for which a legal building *permit* has been issued~~)) that has passed a final inspection.

[RB] BUILDING-INTEGRATED PHOTOVOLTAIC PRODUCT. A building product that incorporates photovoltaic modules and functions as a component of the building envelope.

[RB] BUILDING-INTEGRATED PHOTOVOLTAIC ROOF PANEL (BIPV Roof Panel). A *photovoltaic panel* that functions as a component of the building envelope.

[RB] BUILDING LINE. The line established by law, beyond which a building shall not extend, except as specifically provided by law.

[S][RB] BUILDING OFFICIAL. The ((~~officer or other designated authority charged with the administration and enforcement of this code~~)) Director of the Seattle Department of Construction and Inspections. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[MP] BUILDING SEWER. That part of the drainage system that extends from the end of the *building drain* and conveys its discharge to a public sewer, private sewer, individual sewage-disposal system or other point of disposal.

[S][RE] BUILDING SITE. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[S][RE] BUILDING THERMAL ENVELOPE. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] BUILT-UP ROOF COVERING. Two or more layers of felt cemented together and surfaced with a cap sheet, mineral aggregate, smooth coating or similar surfacing material.

[RB] CAP PLATE. The top plate of the double top plates used in structural insulated panel (SIP) construction. The cap plate is cut to match the panel thickness such that it overlaps the wood structural panel facing on both sides.

[RB] CARBON MONOXIDE ALARM. A single- or multiple-station alarm intended to detect carbon monoxide gas and alert occupants by a distinct audible signal. It incorporates a sensor, control components and an alarm notification appliance in a single unit.

[RB] CARBON MONOXIDE DETECTOR. A device with an integral sensor to detect carbon monoxide gas and transmit an alarm signal to a connected alarm control unit.

[RB] CEILING HEIGHT. The clear vertical distance from the finished floor to the finished ceiling.

[RB] CEMENT PLASTER. A mixture of Portland or blended cement, Portland cement or blended cement and hydrated lime, masonry cement or plastic cement and aggregate and other *approved* materials as specified in this code.

[RB] CHANGE OF OCCUPANCY. A change in the use of a building or portion of a building that involves a change in the application of the requirements of this code.

[W] CHILD CARE, FAMILY HOME. A child care facility, licensed by Washington state, located in the dwelling of the person or persons under whose direct care and supervision the child is placed, for the care of twelve or fewer children, including children who reside at the home.

[W] CHILD DAY CARE. The care of children during any period of a 24 hour day.

[MP] CHIMNEY. A primary vertical structure containing one or more flues, for the purpose of carrying gaseous products of combustion and air from a fuel-burning *appliance* to the outside atmosphere.

[MP] CHIMNEY CONNECTOR. A pipe that connects a fuel-burning *appliance* to a chimney.

[MP] CHIMNEY TYPES.

Residential-type appliance. An *approved* chimney for removing the products of combustion from fuel-burning, residential-type *appliances* producing combustion gases not in excess of 1,000°F (538°C) under normal operating conditions, and capable of producing combustion gases of 1,400°F (760°C) during intermittent forces firing for periods up to 1 hour. All temperatures shall be measured at the *appliance* flue outlet. Residential-type *appliance* chimneys include masonry and factory-built types.

[MP] CIRCUIT VENT. A vent that connects to a horizontal drainage branch and vents two traps to not more than eight traps or trapped fixtures connected into a battery.

[S][MP] CIRCULATING HOT WATER SYSTEM. A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to fixtures and back to the water-heating equipment. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] CLADDING. The exterior materials that cover the surface of the building envelope that is directly loaded by the wind.

[MP] CLEANOUT. An opening in the drainage system used for the removal of possible obstruction and located to allow for *access*.

[S][RE] CLIMATE ZONE. A geographical region based on climatic criteria as specified in this code. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] CLOSET. A small room or chamber used for storage.

[RB] COLLAPSIBLE SOILS. Soils that exhibit volumetric reduction in response to partial or full wetting under load.

[MP] COLLECTION PIPE. Unpressurized pipe used within the collection system that drains on-site nonpotable water or rainwater to a storage tank by gravity.

[MP] COMBINATION WASTE AND VENT SYSTEM. A specially designed system of waste piping embodying the horizontal wet venting of one or more sinks, lavatories or floor drains by means of a common waste and vent pipe adequately sized to provide free movement of air above the flow line of the drain.

[RB] COMBUSTIBLE MATERIAL. Any material not defined as noncombustible.

[MP] COMBUSTION AIR. The air provided to fuel-burning *equipment* including air for fuel combustion, draft hood dilution and ventilation of the *equipment* enclosure.

[MP] COMMON VENT. A single pipe venting two trap arms within the same *branch interval*, either back-to-back or one above the other.

[RB] COMPRESSIBLE SOILS. Soils that exhibit volumetric reduction in response to the application of load even in the absence of wetting or drying.

[MP] CONDENSATE. The liquid that separates from a gas due to a reduction in temperature; for example, water that condenses from flue gases and water that condenses from air circulating through the cooling coil in air conditioning *equipment*.

[MP] CONDENSING APPLIANCE. An *appliance* that condenses water generated by the burning of fuels.

[RB] CONDITIONED AIR. Air treated to control its temperature, relative humidity or quality.

[S][RE] CONDITIONED FLOOR AREA. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[W][RE] CONDITIONED SPACE. ((~~For the definition applicable in Chapter 11, see Section N1101.6.~~)) An area, room or space that is enclosed within the *building thermal envelope* and that is directly or indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate through openings with *conditioned spaces*, where they are separated from *conditioned spaces* by uninsulated walls, floors or ceilings, or where they contain uninsulated ducts, *piping* or other sources of heating or cooling. For the definition applicable to the *Seattle Residential Energy Code*, see Section R202 in the residential section of the *Seattle Energy Code*.

[RB] CONSTRUCTION DOCUMENTS. Written, graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building *permit*. Construction drawings shall be drawn to an appropriate scale.

[MP] CONTAMINATION. A high-hazard or health-hazard impairment of the quality of the potable water that creates an actual hazard to the public health through poisoning or through the spread of disease by sewage, industrial fluids or waste.

[S][RE] CONTINUOUS AIR BARRIER. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[S][RE] CONTINUOUS INSULATION (ci). For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[MP] CONTINUOUS WASTE. A drain from two or more similar adjacent fixtures connected to a single trap.

[MP] CONTROL, LIMIT. An automatic control responsive to changes in liquid flow or level, pressure, or temperature for limiting the operation of an *appliance*.

[MP] CONTROL, PRIMARY SAFETY. A safety control responsive directly to flame properties that senses the presence or absence of flame and, in event of ignition failure or unintentional flame extinguishment, automatically causes shutdown of mechanical *equipment*.

[MP] CONVECTOR. A system incorporating a heating element in an enclosure in which air enters an opening below the heating element, is heated and leaves the enclosure through an opening located above the heating element.

[RB] CORE. The lightweight middle section of a structural insulated panel, composed of foam plastic insulation, that provides the link between the two facing shells.

[RB] CORROSION RESISTANCE. The ability of a material to withstand deterioration of its surface or its properties where exposed to its environment.

[RB] COURT. A space, open and unobstructed to the sky, located at or above *grade* level on a *lot* and bounded on three or more sides by walls or a building.

[RB] CRAWL SPACE. An underfloor space that is not a basement.

[S][RE] CRAWL SPACE WALL. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] CRIPPLE WALL. A framed wall extending from the top of the foundation to the underside of the floor framing of the first *story above grade plane*.

[MP] CROSS CONNECTION. Any connection between two otherwise separate piping systems that allows a flow from one system to the other.

[RB] CROSS-LAMINATED TIMBER. A prefabricated engineered wood product consisting of not less than three layers of solid-sawn lumber or *structural composite lumber* where the adjacent layers are cross-oriented and bonded with structural adhesive to form a solid wood element.

[S][RE] CURTAIN WALL. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] DALLE GLASS. A decorative composite glazing material made of individual pieces of glass that are embedded in a cast matrix of concrete or epoxy.

[S] DAMAGE RATIO. The ratio between the cost of work and the estimated replacement cost of the building, expressed as a percentage. The work includes repair of damage to structural and fire/life safety systems.

[MP] DAMPER, VOLUME. A device that will restrict, retard or direct the flow of air in any duct, or the products of combustion of heat-producing *equipment*, vent connector, vent or chimney.

[RB] DEAD LOADS. The weight of the materials of construction incorporated into the building, including but not limited to walls, floors, roofs, ceilings, stairways, built-in partitions, finishes, cladding, and other similarly incorporated architectural and structural items, and fixed service *equipment*.

[RB] DECORATIVE GLASS. A carved, leaded or Dalle glass or glazing material with a purpose that is decorative or artistic, not functional; with coloring, texture or other design qualities or components that cannot be removed without destroying the glazing material; and with a surface, or assembly into which it is incorporated, that is divided into segments.

[S][RE] DEMAND RECIRCULATION WATER SYSTEM. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[MP] DESIGN PROFESSIONAL. See "*Registered design professional*."

[MP] DEVELOPED LENGTH. The length of a pipeline measured along the center line of the pipe and fittings.

[MP] DIAMETER. Unless specifically stated, the term "diameter" is the nominal diameter as designated by the *approved* material standard.

[RB] DIAPHRAGM. A horizontal or nearly horizontal system acting to transmit lateral forces to the vertical resisting elements. Where the term "*diaphragm*" is used, it includes horizontal bracing systems.

[MP] DILUTION AIR. Air that enters a draft hood or draft regulator and mixes with flue gases.

[MP] DIRECT SYSTEM. A solar thermal system in which the gas or liquid in the solar collector loop is not separated from the load.

[MP] DIRECT-VENT APPLIANCE. A fuel-burning *appliance* with a sealed combustion system that draws all air for combustion from the outside atmosphere and discharges all flue gases to the outside atmosphere.

[W] DISTRIBUTED WHOLE HOUSE VENTILATION. A whole house ventilation system shall be considered distributed when it supplies outdoor air directly (not transfer air) to each dwelling or sleeping unit habitable space (living room, den, office, interior adjoining spaces or bedroom), and exhausts air from all kitchens and bathrooms directly outside.

[MP] DRAFT. The pressure difference existing between the *appliance* or any component part and the atmosphere, that causes a continuous flow of air and products of combustion through the gas passages of the *appliance* to the atmosphere.

Induced draft. The pressure difference created by the action of a fan, blower or ejector, that is located between the *appliance* and the chimney or vent termination.

Natural draft. The pressure difference created by a vent or chimney because of its height, and the temperature difference between the flue gases and the atmosphere.

[MP] DRAFT HOOD. A device built into an *appliance*, or a part of the vent connector from an *appliance*, that is designed to provide for the ready escape of the flue gases from the *appliance* in the event of no draft, backdraft or stoppage beyond the draft hood; prevent a backdraft from entering the *appliance*; and neutralize the effect of stack action of the chimney or gas vent on the operation of the *appliance*.

[MP] DRAFT REGULATOR. A device that functions to maintain a desired draft in the *appliance* by automatically reducing the draft to the desired value.

[RB] DRAFT STOP. A material, device or construction installed to restrict the movement of air within open spaces of concealed areas of building components such as crawl spaces, floor-ceiling assemblies, roof-ceiling assemblies and *attics*.

[MP] DRAIN. Any pipe that carries soil and waterborne wastes in a building drainage system.

[MP] DRAIN-BACK SYSTEM. A solar thermal system in which the fluid in the solar collector loop is drained from the collector into a holding tank under prescribed circumstances.

[MP] DRAINAGE FITTING. A pipe fitting designed to provide connections in the drainage system that have provisions for establishing the desired slope in the system. These fittings are made from a variety of both metals and plastics. The methods of coupling provide for required slope in the system.

[S][RE] DUCT. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[S][MP] DUCT SYSTEM. A continuous passageway for the transmission of air that, in addition to ducts, includes duct fittings, dampers, plenums, fans and accessory air-handling *equipment* and *appliances*.

For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] DWELLING. Any building that contains one or two *dwelling units* used, intended, or designed to be built, used, rented, leased, let or hired out to be occupied, or that are occupied for living purposes.

[W][S][RB] DWELLING UNIT. A single unit providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation. Dwelling units may also include the following uses:

1. *Adult family homes*, foster family care homes and family day care homes licensed by the Washington State Department of Social and Health Services.
2. Offices, mercantile, food preparation for off-site consumption, personal care salons or similar uses which are conducted primarily by the occupants of the dwelling unit and are secondary to the use of the unit for dwelling purposes, and which do not exceed 500 square feet (46.4 m^2). For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[MP] DWV. Abbreviated term for drain, waste and vent piping as used in common plumbing practice.

[MP] EFFECTIVE OPENING. The minimum cross-sectional area at the point of water-supply discharge, measured or expressed in terms of diameter of a circle and if the opening is not circular, the diameter of a circle of equivalent cross-sectional area. (This is applicable to air gap.)

[W] EGRESS ROOF ACCESS WINDOW. A skylight or roof window designed and installed to satisfy the *emergency escape and rescue opening* requirements of Section R310.2.

[MP] ELBOW. A pressure pipe fitting designed to provide an exact change in direction of a pipe run. An elbow provides a sharp turn in the flow path (see “Bend” and “Sweep”).

[RB] EMERGENCY ESCAPE AND RESCUE OPENING. An operable exterior window, door or similar device that provides for a means of escape and access for rescue in the event of an emergency. (See also “Grade floor opening.”)

[S][RE] ENERGY ANALYSIS. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[S][RE] ENERGY COST. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[S][RE] ENERGY SIMULATION TOOL. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[W] ENERGY STORAGE SYSTEMS (ESS). One or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time.

[RB] ENGINEERED WOOD RIM BOARD. A full-depth structural composite lumber, wood structural panel, structural glued laminated timber or prefabricated wood I-joist member designed to transfer horizontal (shear) and vertical (compression) loads, provide attachment for *diaphragm* sheathing, siding and exterior deck ledgers and provide lateral support at the ends of floor or roof joists or rafters.

[MP] EQUIPMENT. Piping, ducts, vents, control devices and other components of systems other than *appliances* that are permanently installed and integrated to provide control of environmental conditions for buildings. This definition shall also include other systems specifically regulated in this code.

[MP] EQUIVALENT LENGTH. For determining friction losses in a piping system, the effect of a particular fitting equal to the friction loss through a straight piping length of the same nominal diameter.

[S][RE] ERI REFERENCE DESIGN. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] ESCARPMENT. With respect to topographic wind effects, a cliff or steep slope generally separating two levels or gently sloping areas.

[MP] ESSENTIALLY NONTOXIC TRANSFER FLUIDS. Fluids having a Gosselin rating of 1, including propylene glycol; mineral oil; polydimethy oil oxane; hydrochlorofluorocarbon, chlorofluorocarbon and hydrofluorocarbon refrigerants; and FDA-approved boiler water additives for steam boilers.

[MP] ESSENTIALLY TOXIC TRANSFER FLUIDS. Soil, water or graywater and fluids having a Gosselin rating of 2 or more including ethylene glycol, hydrocarbon oils, ammonia refrigerants and hydrazine.

[MP] EVAPORATIVE COOLER. A device used for reducing air temperature by the process of evaporating water into an airstream.

[MP] EXCESS AIR. Air that passes through the combustion chamber and the *appliance* flue in excess of what is theoretically required for complete combustion.

[MP] EXHAUST HOOD, FULL OPENING. An exhaust hood with an opening not less than the diameter of the connecting vent.

[MP] EXISTING INSTALLATIONS. Any plumbing system regulated by this code that was legally installed prior to the effective date of this code, or for which a *permit* to install has been issued.

[RB] EXPANSIVE SOILS. Soils that exhibit volumetric increase or decrease (swelling or shrinking) in response to partial or full wetting or drying under load.

[RB] EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS). EIFS are nonstructural, nonload-bearing *exterior wall* cladding systems that consist of an insulation board attached either adhesively or mechanically, or both, to the substrate; an integrally reinforced base coat; and a textured protective finish coat.

[RB] EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS) WITH DRAINAGE. An EIFS that incorporates a means of drainage applied over a water-resistive barrier.

[S][RE] EXTERIOR WALL. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] EXTERIOR WALL COVERING. A material or assembly of materials applied on the exterior side of exterior walls for the purpose of providing a weather-resistive barrier, insulation or for aesthetics, including but not limited to, veneers, siding, exterior insulation and finish systems, architectural trim and embellishments such as cornices, soffits, and fascias.

[RB] FACING. The wood structural panel facings that form the two outmost rigid layers of the structural insulated panel.

[MP] FACTORY-BUILT CHIMNEY. A *listed* and *labeled* chimney composed of factory-made components assembled in the field in accordance with the manufacturer's instructions and the conditions of the *listing*.

[MP] FACTORY-MADE AIR DUCT. A *listed and labeled* duct manufactured in a factory and assembled in the field in accordance with the manufacturer's instructions and conditions of the *listing*.

[S][RE] FENESTRATION. Products classified as either vertical fenestration or skylights and sloped glazing, installed in such a manner as to preserve the weather-resistant barrier of the wall or roof in which they are installed. Fenestration includes products with glass or other transparent or translucent materials.

For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

Skylights. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

Vertical fenestration. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[S][RE] FENESTRATION, VERTICAL. Windows that are fixed or movable, opaque doors, glazed doors, glazed block and combination opaque and glazed doors installed in a wall at less than 15 degrees from vertical.

For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[S][RE] FENESTRATION PRODUCT, SITE-BUILT. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] FIBER-CEMENT (BACKERBOARD, SIDING, SOFFIT, TRIM AND UNDERLAYMENT) PRODUCTS. Manufactured thin section composites of hydraulic cementitious matrices and discrete nonasbestos fibers.

[W][RB] FIRE SEPARATION DISTANCE. The distance measured from the ((~~building~~)) foundation wall or face of the wall framing, whichever is closer, to one of the following:

1. To the closest interior *lot line*; or
2. To the ((~~centerline~~)) opposite side of a street, an alley or public way; or
3. To an imaginary line between two buildings on the *lot*.

The distance shall be measured at a right angle from ((~~the face of~~)) the wall.

[RB] FIREBLOCKING. Building materials or materials *approved* for use as fireblocking, installed to resist the free passage of flame to other areas of the building through concealed spaces.

[RB] FIREPLACE. An assembly consisting of a hearth and fire chamber of noncombustible material and provided with a chimney, for use with solid fuels.

Factory-built fireplace. A *listed* and *labeled* fireplace and chimney system composed of factory-made components, and assembled in the field in accordance with manufacturer's instructions and the conditions of the listing.

Masonry fireplace. A field-constructed fireplace composed of *solid masonry* units, bricks, stones or concrete.

[MP] FIREPLACE STOVE. A free-standing, chimney-connected solid-fuel-burning heater designed to be operated with the fire chamber doors in either the open or closed position.

[RB] FIREPLACE THROAT. The opening between the top of the firebox and the smoke chamber.

[RB] FIRE-RETARDANT-TREATED WOOD. Pressure-treated lumber and plywood that exhibit reduced surface burning characteristics and resist propagation of fire.

Other means during manufacture. A process where the wood raw material is treated with a fire-retardant formulation while undergoing creation as a finished product.

Pressure process. A process for treating wood using an initial vacuum followed by the introduction of pressure above atmospheric.

[MP] FIXTURE. See "Plumbing fixture."

[MP] FIXTURE BRANCH, DRAINAGE. A drain serving two or more fixtures that discharges into another portion of the drainage system.

[MP] FIXTURE BRANCH, WATER-SUPPLY. A water-supply pipe between the fixture supply and a main water-distribution pipe or fixture group main.

[MP] FIXTURE DRAIN. The drain from the trap of a fixture to the junction of that drain with any other drain pipe.

[MP] FIXTURE FITTING.

Supply fitting. A fitting that controls the volume or directional flow or both of water and that is either attached to or accessed from a fixture or is used with an open or atmospheric discharge.

Waste fitting. A combination of components that conveys the sanitary waste from the outlet of a fixture to the connection of the sanitary drainage system.

[MP] FIXTURE GROUP, MAIN. The main water-distribution pipe (or secondary branch) serving a plumbing fixture grouping such as a bath, kitchen or laundry area to which two or more individual fixture branch pipes are connected.

[MP] FIXTURE SUPPLY. The water-supply pipe connecting a fixture or fixture fitting to a fixture branch.

[MP] FIXTURE UNIT, DRAINAGE (d.f.u.). A measure of probable discharge into the drainage system by various types of plumbing fixtures, used to size DWV piping systems. The drainage fixture-unit value for a particular fixture depends on its volume rate of drainage discharge, on the time duration of a single drainage operation and on the average time between successive operations.

[MP] FIXTURE UNIT, WATER-SUPPLY (w.s.f.u.). A measure of the probable hydraulic demand on the water supply by various types of plumbing fixtures used to size water-piping systems. The water-supply fixture-unit value for a particular fixture depends on its volume rate of supply, on the time duration of a single supply operation and on the average time between successive operations.

[RB] FLAME SPREAD. The propagation of flame over a surface.

[RB] FLAME SPREAD INDEX. A comparative measure, expressed as a dimensionless number, derived from visual measurements of the spread of flame versus time for a material tested in accordance with ASTM E84 or UL 723.

[MP] FLEXIBLE AIR CONNECTOR. A conduit for transferring air between an air duct or plenum and an air terminal unit, an air inlet or an air outlet. Such conduit is limited in its use, length and location.

[RB] FLIGHT. A continuous run of rectangular treads or winders or combination thereof from one landing to another.

[S] FLOATING HOME. A single-family dwelling constructed to float, which is moored, anchored or otherwise secured in waters. A floating home is not a vessel, even though it may be capable of being towed, and is not a "floating on water residence" as defined in the *Seattle Municipal Code* Title 23.

[S] FLOATING HOME MOORAGE. A waterfront facility for the moorage of one or more *floating homes* and the land and water premises on which it is located.

[S] FLOATING HOME SITE. A part of a *floating home moorage*, located over water, and designed to accommodate one *floating home*.

[MP] FLOOD-LEVEL RIM. The edge of the receptor or fixture from which water overflows.

[W] FLOOR AREA. The area within the inside perimeter of exterior walls of the building. The floor area of a building, or portion thereof, not provided with surrounding exterior walls shall be the usable area under the horizontal projection of the roof or floor above.

[MP] FLOOR DRAIN. A plumbing fixture for recess in the floor having a floor-level strainer intended for the purpose of the collection and disposal of wastewater used in cleaning the floor and for the collection and disposal of accidental spillage to the floor.

[MP] FLOOR FURNACE. A self-contained furnace suspended from the floor of the space being heated, taking air for combustion from outside such space, and with means for lighting the *appliance* from such space.

[MP] FLOW PRESSURE. The static pressure reading in the water-supply pipe near the faucet or water outlet while the faucet or water outlet is open and flowing at capacity.

[MP] FLUE. See "Vent."

[MP] FLUE, APPLIANCE. The passages within an *appliance* through which combustion products pass from the combustion chamber to the flue collar.

[MP] FLUE COLLAR. The portion of a fuel-burning *appliance* designed for the attachment of a draft hood, vent connector or venting system.

[MP] FLUE GASES. Products of combustion plus excess air in *appliance* flues or heat exchangers.

[MP] FLUSH VALVE. A device located at the bottom of a flush tank that is operated to flush water closets.

[MP] FLUSHOMETER TANK. A device integrated within an air accumulator vessel that is designed to discharge a predetermined quantity of water to fixtures for flushing purposes.

[MP] FLUSHOMETER VALVE. A flushometer valve is a device that discharges a predetermined quantity of water to fixtures for flushing purposes and is actuated by direct water pressure.

[RB] FOAM BACKER BOARD. Foam plastic used in siding applications where the foam plastic is a component of the siding.

[RB] FOAM PLASTIC INSULATION. A plastic that is intentionally expanded by the use of a foaming agent to produce a reduced-density plastic containing voids consisting of open or closed cells distributed throughout the plastic for thermal insulating or acoustic purposes and that has a density less than 20 pounds per cubic foot (320 kg/m^3) unless it is used as interior trim.

[RB] FOAM PLASTIC INTERIOR TRIM. Exposed foam plastic used as picture molds, chair rails, crown moldings, baseboards, handrails, ceiling beams, door trim and window trim and similar decorative or protective materials used in fixed applications.

[MP] FUEL-PIPING SYSTEM. All piping, tubing, valves and fittings used to connect fuel utilization *equipment* to the point of fuel delivery.

[MP] FULL-OPEN VALVE. A water control or shutoff component in the water supply system piping that, where adjusted for maximum flow, the flow path through the component's closure member is not a restriction in the component's through-flow area.

[MP] FULLWAY VALVE. A valve that in the full open position has an opening cross-sectional area that is not less than 85 percent of the cross-sectional area of the connecting pipe.

[MP] FURNACE. A vented heating *appliance* designed or arranged to discharge heated air into a *conditioned space* or through a duct or ducts.

[S] GARBAGE. All discarded putrescible waste matter, including small dead animals weighing not over 15 pounds (6.8 kg), but not including sewage or human or animal excrement.

[RB] GLAZING AREA. The interior surface area of all glazed fenestration, including the area of sash, curbing or other framing elements, that enclose *conditioned space*. Includes the area of glazed fenestration assemblies in walls bounding conditioned *basements*.

[RB] GRADE. The finished ground level adjoining the building at all *exterior walls*.

[MP] GRADE, PIPING. See "Slope."

[RB] GRADE FLOOR OPENING. A window or other opening located such that the sill height of the opening is not more than 44 inches (1118 mm) above or below the finished ground level adjacent to the opening. (See also "Emergency escape and rescue opening.")

[RB] GRADE PLANE. A reference plane representing the average of the finished ground level adjoining the building at all *exterior walls*. Where the finished ground level slopes away from the *exterior walls*, the reference plane shall be established by the lowest points within the area between the building and the *lot line* or, where the *lot line* is more than 6 feet (1829 mm) from the building between the structure and a point 6 feet (1829 mm) from the building.

[MP] GRAYWATER. Waste discharged from lavatories, bathtubs, showers, clothes washers and laundry trays.

[MP] GRIDDED WATER DISTRIBUTION SYSTEM. A water distribution system where every water distribution pipe is interconnected so as to provide two or more paths to each fixture supply pipe.

[RB] GROSS AREA OF EXTERIOR WALLS. The normal projection of all *exterior walls*, including the area of all windows and doors installed therein.

[MP] GROUND-SOURCE HEAT PUMP LOOP SYSTEM. Piping buried in horizontal or vertical excavations or placed in a body of water for the purpose of transporting heat transfer liquid to and from a heat pump. Included in this definition are closed loop systems in which the liquid is recirculated and open loop systems in which the liquid is drawn from a well or other source.

[RB] GUARD. A building component or a system of building components located near the open sides of elevated walking surfaces that minimizes the possibility of a fall from the walking surface to the lower level.

[RB] GUESTROOM. Any room or rooms used or intended to be used by one or more guests for living or sleeping purposes.

[RB] GYPSUM BOARD. The generic name for a family of sheet products consisting of a noncombustible core primarily of gypsum with paper surfacing. Gypsum wallboard, gypsum sheathing, gypsum base for gypsum *veneer* plaster, exterior gypsum soffit board, predecorated gypsum board and water-resistant gypsum backing board complying with the standards listed in Section R702.3 and Part IX of this code are types of gypsum board.

[RB] GYPSUM PANEL PRODUCT. The general name for a family of sheet products consisting essentially of gypsum.

[RB] HABITABLE SPACE. A space in a building for living, sleeping, eating or cooking. Bathrooms, toilet rooms, closets, halls, storage or utility spaces and similar areas are not considered *habitable spaces*.

[RB] HANDRAIL. A horizontal or sloping rail intended for grasping by the hand for guidance or support.

[MP] HANGERS. See "Supports."

[MP] HAZARDOUS LOCATION. Any location considered to be a fire hazard for flammable vapors, dust, combustible fibers or other highly combustible substances.

[MP] HEAT PUMP. An *appliance* having heating or heating and cooling capability and that uses refrigerants to extract heat from air, liquid or other sources.

[S][RE] HEATED SLAB. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] HEIGHT, BUILDING. The vertical distance from *grade plane* to the average height of the highest roof surface.

[RB] HEIGHT, STORY. The vertical distance from top to top of two successive tiers of beams or finished floor surfaces; and, for the topmost *story*, from the top of the floor finish to the top of the ceiling joists or, where there is not a ceiling, to the top of the roof rafters.

[S][RE] HIGH-EFFICACY LAMPS. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[MP] HIGH-TEMPERATURE (H.T.) CHIMNEY. A high temperature chimney complying with the requirements of UL 103. A Type H.T. chimney is identifiable by the markings "Type H.T." on each chimney pipe section.

[RB] HILL. With respect to topographic wind effects, a land surface characterized by strong relief in any horizontal direction.

[S][RB] HISTORIC BUILDING. ((~~A building or structure that is one or more of the following:~~

1. ~~Listed, or certified as eligible for listing, by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places in the National Register of Historic Places.~~
2. ~~Designated as historic under an applicable state or local law.~~
3. ~~Certified as a contributing resource within a National Register listed, or a state designated or locally designated historic district.~~

~~For the definition applicable in Chapter 11, see Section N1101.6.~~)) See "LANDMARK."

[MP] HORIZONTAL BRANCH, DRAINAGE. A drain pipe extending laterally from a soil or waste stack or *building drain*, that receives the discharge from one or more *fixture drains*.

[MP] HORIZONTAL PIPE. Any pipe or fitting that makes an angle of less than 45 degrees (0.79 rad) with the horizontal.

[MP] HOT WATER. Water at a temperature greater than or equal to 110°F (43°C).

[RB] HURRICANE-PRONE REGIONS. Areas vulnerable to hurricanes, defined as the U.S. Atlantic Ocean and Gulf of Mexico coasts where the ultimate design wind speed, V_{ult}, is greater than 115 miles per hour (51 m/s), and Hawaii, Puerto Rico, Guam, Virgin Islands and America Samoa.

[MP] HYDROGEN-GENERATING APPLIANCE. A self-contained package or factory-matched packages of integrated systems for generating gaseous hydrogen. Hydrogen-generating *appliances* utilize electrolysis, reformation, chemical or other processes to generate hydrogen.

[MP] IGNITION SOURCE. A flame, spark or hot surface capable of igniting flammable vapors or fumes. Such sources include *appliance* burners, burner ignitions and electrical switching devices.

[RB] IMPACT PROTECTIVE SYSTEM. Construction that has been shown by testing to withstand the impact of test missiles and that is applied, attached, or locked over exterior glazing.

[MP] INDIRECT SYSTEM. A solar thermal system in which the gas or liquid in the solar collector loop circulates between the solar collector and a heat exchanger and such gas or liquid is not drained from the system or supplied to the load during normal operation.

[MP] INDIRECT WASTE PIPE. A waste pipe that discharges into the drainage system through an *air gap* into a trap, fixture or receptor.

[MP] INDIVIDUAL SEWAGE DISPOSAL SYSTEM. A system for disposal of sewage by means of a septic tank or mechanical treatment, designed for use apart from a public sewer to serve a single establishment or building.

[MP] INDIVIDUAL VENT. A pipe installed to vent a single *fixture drain* that connects with the vent system above or terminates independently outside the building.

[MP] INDIVIDUAL WATER SUPPLY. A supply other than an approved public water supply that serves one or more families.

[S][RE] INFILTRATION. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] INSULATED SIDING. A type of continuous insulation, with manufacturer-installed insulating material as an integral part of the cladding product, having a minimum *R*-value of R-2. For the definition applicable in Chapter 11, see Section N1101.6.

[RB] INSULATED VINYL SIDING. A vinyl cladding product, with manufacturer-installed foam plastic insulating material as an integral part of the cladding product, having a thermal resistance of not less than R-2.

[RB] INSULATING CONCRETE FORM (ICF). A concrete forming system using stay-in-place forms of rigid foam plastic insulation, a hybrid of cement and foam insulation, a hybrid of cement and wood chips, or other insulating material for constructing cast-in-place concrete walls.

[S][RB] INSULATING SHEATHING. An insulating board having a thermal resistance of not less than R-2 of the core material.

For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[S][RB] JURISDICTION. The ((~~governmental unit that has adopted this code~~)) City of Seattle.

[RB] KITCHEN. Kitchen shall mean an area used, or designated to be used, for the preparation of food.

[RB] LABEL. An identification applied on a product by the manufacturer that contains the name of the manufacturer, the function and performance characteristics of the product or material, and the name and identification of an *approved agency* and that indicates that the representative sample of the product or material has been tested and evaluated by an *approved agency*. (See also "Manufacturer's designation" and "Mark.")

[S][RB] LABELED. *Equipment*, materials or products to which have been affixed a *label*, seal, symbol or other identifying *mark* of a nationally recognized testing laboratory, approved agency or other organization concerned with product evaluation that maintains periodic inspection of the production of such *labeled* items and whose labeling indicates either that the *equipment*, material or product meets identified standards or has been tested and found suitable for a specified purpose. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[S] LAND-DISTURBING ACTIVITY. Any activity that results in a movement of earth, or a change in the existing soil cover, both vegetative and nonvegetative, or the existing topography. Land-disturbing activities include, but are not limited to, clearing, grading, filling, excavation or addition of new or the replacement of impervious surface. Compaction, excluding hot asphalt mix, that is associated with stabilization of structures and road construction shall also be considered a land-disturbing activity. Vegetation maintenance practices are not considered land-disturbing activities.

[W] LANDING PLATFORM. A landing provided as the top step of a stairway accessing a *sleeping loft.*

[S] LANDMARK. A building or structure that is subject to a requirement to obtain a certificate of approval from the City Landmarks Preservation Board before altering or making significant changes to specific features or characteristics, that has been nominated for designation and the City Landmarks Preservation Board has not issued a determination regarding designation, that has been designated for preservation by the City Landmarks Preservation Board, that has been designated for preservation by the State of Washington, that has been listed or determined eligible to be listed in the National Register of Historic Places, or that is located in a landmark or special review district subject to a requirement to obtain a certificate of approval before making a change to the external appearance of a structure.

[RB] LIGHT-FRAME CONSTRUCTION. Construction whose vertical and horizontal structural elements are primarily formed by a system of repetitive wood or cold-formed steel framing members.

[S][RB] LISTED. *Equipment*, materials, products or services included in a list published by an organization acceptable to the code official and concerned with evaluation of products or services that maintains periodic inspection of production of *listed equipment* or materials or periodic evaluation of services and whose listing states either that the *equipment*, material, product or service meets identified standards or has been tested and found suitable for a specified purpose. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] LIVE LOADS. Those loads produced by the use and occupancy of the building or other structure and do not include construction or environmental loads such as wind load, snow load, rain load, earthquake load, flood load or dead load.

[MP] LIVING SPACE. Space within a *dwelling unit* utilized for living, sleeping, eating, cooking, bathing, washing and sanitation purposes.

[W][MP] LOCAL EXHAUST. An exhaust system that uses one or more fans to exhaust air from a specific room or rooms within a residential dwelling or sleeping unit.

[MP] LOCKING-TYPE TAMPER-RESISTANT CAP. A cap designed to be unlocked by a specially designed tool or key to prevent removal of the cap by means of hand-loosening or by commonly available tools.

[RB] LODGING HOUSE. A one-family dwelling where one or more occupants are primarily permanent in nature, and rent is paid for guestrooms.

[W][RB] LOT. A measured portion or parcel of land considered as a unit having fixed boundaries.

[W][RB] LOT LINE. ((~~A~~)) The line ((~~dividing one~~)) which bounds a plot of ground described as a *lot* ((~~from another, or from a street or any public place~~)) in the title to the property.

[S][RE] LOW-VOLTAGE LIGHTING. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[MP] MACERATING TOILET SYSTEMS. A system comprised of a sump with macerating pump and with connections for a water closet and other plumbing fixtures, that is designed to accept, grind and pump wastes to an *approved* point of discharge.

[MP] MAIN. The principal pipe artery to which branches may be connected.

[MP] MAIN SEWER. See "Public sewer."

[MP] MANIFOLD WATER DISTRIBUTION SYSTEMS. A fabricated piping arrangement in which a large supply main is fitted with multiple branches in close proximity in which water is distributed separately to fixtures from each branch.

[S][RE] MANUAL. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] MANUFACTURED HOME. *Manufactured home* means a structure, transportable in one or more sections, that in the traveling mode is 8 body feet (2438 body mm) or more in width or 40 body feet (12 192 body mm) or more in length, or, where erected on site, is 320 square feet (30 m^2) or more, and that is built on a permanent chassis and designed to be used as a *dwelling* with or without a permanent foundation where connected to the required utilities, and includes the plumbing, heating, air-conditioning and electrical systems contained therein; except that such term shall include any structure that meets all the requirements of this paragraph except the size requirements and with respect to which the manufacturer voluntarily files a certification required by the secretary (HUD) and complies with the standards established under this title. For mobile homes built prior to June 15, 1976, a *label* certifying compliance to the Standard for Mobile Homes, NFPA 501, in effect at the time of manufacture is required. For the purpose of these provisions, a mobile home shall be considered to be a *manufactured home*.

[RB] MANUFACTURER'S DESIGNATION. An identification applied on a product by the manufacturer indicating that a product or material complies with a specified standard or set of rules. (See also "Mark" and "Label.")

[RB] MANUFACTURER'S INSTALLATION INSTRUCTIONS. Printed instructions included with *equipment* as part of the conditions of their *listing* and *labeling*.

[RB] MARK. An identification applied on a product by the manufacturer indicating the name of the manufacturer and the function of a product or material. (See also "Manufacturer's designation" and "Label.")

[RB] MASONRY CHIMNEY. A field-constructed chimney composed of solid masonry units, bricks, stones or concrete.

[RB] MASONRY HEATER. A masonry heater is a solid fuel burning heating *appliance* constructed predominantly of concrete or solid masonry having a mass of not less than 1,100 pounds (500 kg), excluding the chimney and foundation. It is designed to absorb and store a substantial portion of heat from a fire built in the firebox by routing exhaust gases through internal heat exchange channels in which the flow path downstream of the firebox includes not less than one 180-degree (3.14-rad) change in flow direction before entering the chimney and that deliver heat by radiation through the masonry surface of the heater.

[RB] MASONRY, SOLID. Masonry consisting of solid masonry units laid contiguously with the joints between the units filled with mortar.

[RB] MASONRY UNIT. Brick, tile, stone, architectural cast stone, glass block or concrete block conforming to the requirements specified in Section 2103 of the *International Building Code*.

Clay. A building unit larger in size than a brick, composed of burned clay, shale, fire clay or mixtures thereof.

Concrete. A building unit or block larger in size than 12 inches by 4 inches by 4 inches (305 mm by 102 mm by 102 mm) made of cement and suitable aggregates.

Glass. Nonload-bearing masonry composed of glass units bonded by mortar.

Hollow. A masonry unit with a net cross-sectional area in any plane parallel to the loadbearing surface that is less than 75 percent of its gross cross-sectional area measured in the same plane.

Solid. A masonry unit with a net cross-sectional area in every plane parallel to the loadbearing surface that is 75 percent or more of its cross-sectional area measured in the same plane.

[RB] MEAN ROOF HEIGHT. The average of the roof eave height and the height to the highest point on the roof surface, except that eave height shall be used for roof angle of less than or equal to 10 degrees (0.18 rad).

[MP] MECHANICAL DRAFT SYSTEM. A venting system designed to remove flue or vent gases by mechanical means, that consists of an induced draft portion under nonpositive static pressure or a forced draft portion under positive static pressure.

Forced draft venting system. A portion of a venting system using a fan or other mechanical means to cause the removal of flue or vent gases under positive static pressure.

Induced draft venting system. A portion of a venting system using a fan or other mechanical means to cause the removal of flue or vent gases under nonpositive static vent pressure.

Power venting system. A portion of a venting system using a fan or other mechanical means to cause the removal of flue or vent gases under positive static vent pressure.

[MP] MECHANICAL EXHAUST SYSTEM. A system for removing air from a room or space by mechanical means.

[MP] MECHANICAL JOINT.

1. A connection between pipes, fittings or pipes and fittings that is not welded, brazed, caulked, soldered, solvent cemented or heat-fused.

2. A general form of gas- or liquid-tight connections obtained by the joining of parts through a positive holding mechanical construction such as, but not limited to, flanged, screwed, clamped or flared connections.

[MP] MECHANICAL SYSTEM. A system specifically addressed and regulated in this code and composed of components, devices, *appliances* and *equipment*.

[RB] METAL ROOF PANEL. An interlocking metal sheet having an installed weather exposure of not less than 3 square feet (0.28 m^2) per sheet.

[RB] METAL ROOF SHINGLE. An interlocking metal sheet having an installed weather exposure less than 3 square feet (0.28 m^2) per sheet.

[W][RB] MEZZANINE. An intermediate level or levels between the floor and ceiling of any *story*.

[RB] MODIFIED BITUMEN ROOF COVERING. One or more layers of polymer modified asphalt sheets. The sheet materials shall be fully adhered or mechanically attached to the substrate or held in place with an *approved* ballast layer.

[RB] MULTIPLE-STATION SMOKE ALARM. Two or more single-station alarm devices that are capable of interconnection such that actuation of one causes all integral or separate audible alarms to operate.

[RB] NAILABLE SUBSTRATE. A product or material such as framing, sheathing or furring, composed of wood or wood-based materials, or other materials and fasteners providing equivalent fastener withdrawal resistance.

[MP] NATURAL DRAFT SYSTEM. A venting system designed to remove flue or vent gases under nonpositive static vent pressure entirely by natural draft.

[RB] NATURALLY DURABLE WOOD. The heartwood of the following species with the exception that an occasional piece with corner sapwood is permitted if 90 percent or more of the width of each side on which it occurs is heartwood.

Decay resistant. Redwood, cedar, black locust and black walnut.

Termite resistant. Alaska yellow cedar, redwood, Eastern red cedar and Western red cedar including all sapwood of Western red cedar.

[RB] NONCOMBUSTIBLE MATERIAL. Materials that pass the test procedure for defining noncombustibility of elementary materials set forth in ASTM E136.

[RB] NOSING. The leading edge of treads of stairs and of landings at the top of stairway flights.

[RB] OCCUPIED SPACE. The total area of all buildings or structures on any *lot* or parcel of ground projected on a horizontal plane, excluding permitted projections as allowed by this code.

[MP] OFFSET. A combination of fittings that makes two changes in direction, bringing one section of the pipe out of line and into a line parallel with the other section.

[MP] ON-SITE NONPOTABLE WATER REUSE SYSTEMS. Water systems for the collection, treatment, storage, distribution, and reuse of nonpotable water generated on site, including but not limited to graywater systems. This definition does not include rainwater harvesting systems.

[S][RE] OPAQUE DOOR. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] OWNER. Any person, agent, firm or corporation having a legal or equitable interest in the property.

[RB] PAN FLASHING. Corrosion-resistant flashing at the base of an opening that is integrated into the building exterior wall to direct water to the exterior and is premanufactured, fabricated, formed or applied at the job site.

[RB] PANEL THICKNESS. Thickness of core plus two layers of structural wood panel facings.

[MP] PELLET FUEL-BURNING APPLIANCE. A closed combustion, vented *appliance* equipped with a fuel feed mechanism for burning processed pellets of solid fuel of a specified size and composition.

[MP] PELLET VENT. A vent *listed* and *labeled* for use with a *listed* pellet fuel-burning *appliance.*

[RB] PERFORMANCE CATEGORY. A designation of wood structural panels as related to the panel performance used in Chapters 4, 5, 6 and 8.

[RB] PERMIT. An official document or certificate issued by the *building official* that authorizes performance of a specified activity.

[S][RB] PERSON. Any individual, ((~~heirs, executors, administrators or assigns, and a~~)) receiver, administrator, executor, trustee in bankruptcy, trust, estate firm, partnership, joint venture, club, company, joint stock company, business trust, municipal corporation, political subdivision of the State of Washington, the State of Washington and any instrumentality thereof, ((~~or~~)) corporation, ((~~its or their successors or assigns, or the agent of any of the aforesaid~~)) limited liability company, association, society or any group of individuals acting as a unit, whether mutual, cooperative, fraternal, nonprofit or otherwise, and the United States or any instrumentality thereof.

[RB] PHOTOVOLTAIC MODULE. A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of a tracker, designed to generate DC power where exposed to sunlight.

[RB] PHOTOVOLTAIC PANEL. A collection of photovoltaic modules mechanically fastened together, wired, and designed to provide a field-installable unit.

[RB] PHOTOVOLTAIC PANEL SYSTEM. A system that incorporates discrete photovoltaic panels that convert solar radiation into electricity, including rack support systems.

[RB] PHOTOVOLTAIC SHINGLES. A *roof covering* that resembles shingles and that incorporates photovoltaic modules.

[MP] PITCH. See "Slope."

[RB] PLASTIC COMPOSITE. A generic designation that refers to wood-plastic composites and plastic lumber.

[RB] PLATFORM CONSTRUCTION. A method of construction by which floor framing bears on load bearing walls that are not continuous through the *story* levels or floor framing.

[MP] PLENUM. A chamber that forms part of an air-circulation system other than the *occupied space* being conditioned.

[MP] PLUMBING. For the purpose of this code, plumbing refers to those installations, repairs, maintenance and *alterations* regulated by Chapters 25 through 33.

[MP] PLUMBING APPLIANCE. An energized household *appliance* with plumbing connections, such as a dishwasher, food waste disposer, clothes washer or water heater.

[MP] PLUMBING APPURTENANCE. A device or assembly that is an adjunct to the basic plumbing system and does not demand additional water supply or add any discharge load to the system. It is presumed that it performs some useful function in the operation, maintenance, servicing, economy or safety of the plumbing system. Examples include filters, relief valves and aerators.

[MP] PLUMBING FIXTURE. A receptacle or device that is connected to a water supply system or discharges to a drainage system or both. Such receptacles or devices require a supply of water; or discharge liquid waste or liquidborne solid waste; or require a supply of water and discharge waste to a drainage system.

[MP] PLUMBING SYSTEMS. Includes the water distribution pipes; plumbing fixtures and traps; water-treating or water-using *equipment*; soil, waste and vent pipes; and building drains; in addition to their respective connections, devices and appurtenances within a structure or premises; and the water service, building sewer and building storm sewer serving such structure or premises.

[MP] POLLUTION. A low-hazard or nonhealth-hazard impairment of the quality of the potable water to a degree that does not create a hazard to the public health and that does adversely and unreasonably affect the aesthetic qualities of such potable water for domestic use.

[RB] POLYPROPYLENE SIDING. A shaped material, made principally from polypropylene homopolymer, or copolymer, that in some cases contains fillers or reinforcements, that is used to clad *exterior walls* or buildings.

[MP] PORTABLE-FUEL-CELL APPLIANCE. A fuel cell generator of electricity that is not fixed in place. A portable-fuel-cell *appliance* utilizes a cord and plug connection to a grid-isolated load and has an integral fuel supply.

[RB] POSITIVE ROOF DRAINAGE. The drainage condition in which consideration has been made for the loading deflections of the roof deck, and additional slope has been provided to ensure drainage of the roof within 48 hours of precipitation.

[MP] POTABLE WATER. Water free from impurities present in amounts sufficient to cause disease or harmful physiological effects and conforming in bacteriological and chemical quality to the requirements of the public health authority having jurisdiction.

[RB] PRECAST CONCRETE. A structural concrete element cast elsewhere than its final position in the structure.

[RB] PRECAST CONCRETE FOUNDATION WALLS. Preengineered, precast concrete wall panels that are designed to withstand specified stresses and used to build below-*grade* foundations.

[MP] PRESSURE-RELIEF VALVE. A pressure-actuated valve held closed by a spring or other means and designed to automatically relieve pressure at the pressure at which it is set.

[S][RE] PROPOSED DESIGN. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[MP] PUBLIC SEWER. A common sewer directly controlled by public authority.

[MP] PUBLIC WATER MAIN. A water-supply pipe for public use controlled by public authority.

[RB] PUBLIC WAY. Any street, alley or other parcel of land open to the outside air leading to a public street, that has been deeded, dedicated or otherwise permanently appropriated to the public for public use and that has a clear width and height of not less than 10 feet (3048 mm).

[MP] PURGE. To clear of air, gas or other foreign substances.

[MP] QUICK-CLOSING VALVE. A valve or faucet that closes automatically where released manually or controlled by mechanical means for fast-action closing.

[RB] RAMP. A walking surface that has a running slope steeper than 1 unit vertical in 20 units horizontal (5-percent slope).

[S][RE] RATED DESIGN. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[S][RE] READILY ACCESSIBLE. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] READY ACCESS (TO). That which enables a device, *appliance* or *equipment* to be directly reached, without requiring the removal or movement of any panel, door or similar obstruction.

[MP] RECEPTOR. A fixture or device that receives the discharge from indirect waste pipes.

[MP] RECLAIMED WATER. Nonpotable water that has been derived from the treatment of wastewater by a facility or system licensed or permitted to produce water meeting the *jurisdiction's* water requirements for its intended uses. Also known as "Recycled water."

[S] REFLECTIVE DUCT INSULATION. A thermal insulation assembly consisting of one or more surfaces that have an emittance of 0.1 or less, and that bound an enclosed air space or spaces.

[MP] REFRIGERANT. A substance used to produce refrigeration by its expansion or evaporation.

[MP] REFRIGERANT COMPRESSOR. A specific machine, with or without accessories, for compressing a given refrigerant vapor.

[MP] REFRIGERATING SYSTEM. A combination of interconnected parts forming a closed circuit in which refrigerant is circulated for the purpose of extracting, then rejecting, heat. A direct refrigerating system is one in which the evaporator or condenser of the refrigerating system is in direct contact with the air or other substances to be cooled or heated. An indirect refrigerating system is one in which a secondary coolant cooled or heated by the refrigerating system is circulated to the air or other substance to be cooled or heated.

[RB] REGISTERED DESIGN PROFESSIONAL. An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or *jurisdiction* in which the project is to be constructed.

[MP] RELIEF VALVE, VACUUM. A device to prevent excessive buildup of vacuum in a pressure vessel.

[S][RB] REPAIR. The reconstruction, replacement or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.

For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[S][RB] REROOFING. The process of recovering or replacing an existing roof covering. See "Roof recover."

For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[S][RE] RESIDENTIAL BUILDING. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[MP] RETURN AIR. Air removed from an *approved conditioned space* or location and recirculated or exhausted.

[RB] RIDGE. With respect to topographic wind effects, an elongated crest of a *hill* characterized by strong relief in two directions.

[MP] RISER (PLUMBING). A water pipe that extends vertically one full *story* or more to convey water to branches or to a group of fixtures.

[RB] RISER (STAIR). The vertical component of a step or stair.

[S][RB] ROOF ASSEMBLY. A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly includes the roof deck, underlayment and *roof covering*, and can also include a thermal barrier, ignition barrier, insulation or a vapor retarder. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] ROOF COATING. A fluid-applied, adhered coating used for roof maintenance or *roof repair*, or as a component of a *roof covering* system or *roof assembly*.

[RB] ROOF COVERING. The covering applied to the roof deck for weather resistance, fire classification or appearance.

[RB] ROOF COVERING SYSTEM. See "Roof assembly."

[RB] ROOF DECK. The flat or sloped surface not including its supporting members or vertical supports.

[S][RB] ROOF RECOVER. The process of installing an additional *roof covering* over a prepared existing roof covering without removing the existing roof covering. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[S][RB] ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[S][RB] ROOF REPLACEMENT. The process of removing the existing *roof covering*, repairing any damaged substrate and installing a new *roof covering*. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[MP] ROOM HEATER. A free-standing heating *appliance* installed in the space being heated and not connected to ducts.

[MP] ROUGH-IN. The installation of the parts of the plumbing system that must be completed prior to the installation of fixtures. This includes DWV, water supply and built-in fixture supports.

[RB] RUNNING BOND. The placement of masonry units such that head joints in successive courses are horizontally offset not less than one-quarter the unit length.

[S][RE] *R*-VALUE (THERMAL RESISTANCE). For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[MP] SANITARY SEWER. A sewer that carries sewage and excludes storm, surface and groundwater.

[RB] SCUPPER. An opening in a wall or parapet that allows water to drain from a roof.

[RB] SEISMIC DESIGN CATEGORY (SDC). A classification assigned to a structure based on its occupancy category and the severity of the design earthquake ground motion at the site.

[MP] SEPTIC TANK. A water-tight receptor that receives the discharge of a building sanitary drainage system and is constructed so as to separate solids from the liquid, digest organic matter through a period of detention, and allow the liquids to discharge into the soil outside of the tank through a system of open joint or perforated piping or a seepage pit.

[S][RE] SERVICE WATER HEATING. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[S][MP] SEWAGE. ((~~Any liquid waste containing animal matter, vegetable matter or other impurity in suspension or solution.~~)) All water-carried waste discharged from the sanitary facilities of buildings occupied or used by people.

[MP] SEWAGE PUMP. A permanently installed mechanical device for removing sewage or liquid waste from a sump.

[RB] SHALL. The term, where used in the code, is construed as mandatory.

[RB] SHEAR WALL. A general term for walls that are designed and constructed to resist racking from seismic and wind by use of masonry, concrete, cold-formed steel or wood framing in accordance with Chapter 6 of this code and the associated limitations in Section R301.2 of this code.

[RB] SHINGLE FASHION. A method of installing roof or wall coverings, water-resistive barriers, flashing or other building components such that upper layers of material are placed overlapping lower layers of material to provide drainage and protect against water intrusion at unsealed penetrations and joints or in combination with sealed joints.

[RB] SINGLE-PLY MEMBRANE. A roofing membrane that is field applied using one layer of membrane material (either homogeneous or composite) rather than multiple layers.

[RB] SINGLE-STATION SMOKE ALARM. An assembly incorporating the detector, control *equipment* and alarm sounding device in one unit that is operated from a power supply either in the unit or obtained at the point of installation.

[S][RE] SKYLIGHT. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] SKYLIGHT, UNIT. A factory assembled, glazed fenestration unit, containing one panel of glazing material, that allows for natural daylighting through an opening in the roof assembly while preserving the weather-resistant barrier of the roof.

[S][RB] SKYLIGHTS AND SLOPED GLAZING. Glass or other transparent or translucent glazing material installed at a slope of 15 degrees (0.26 rad) or more from vertical. Unit skylights, tubular daylighting devices and glazing materials in solariums, sunrooms, roofs and sloped walls are included in this definition. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[W] SLEEPING LOFT. A sleeping space on a floor level located more than 30 inches (726 mm) above the main floor and open to the main floor on one or more sides with a ceiling height of less than 6 feet 8 inches (2032 mm).

[MP] SLIP JOINT. A mechanical-type joint used primarily on fixture traps. The joint tightness is obtained by compressing a friction-type washer such as rubber, nylon, neoprene, lead or special packing material against the pipe by the tightening of a (slip) nut.

[MP] SLOPE. The fall (pitch) of a line of pipe in reference to a horizontal plane. In drainage, the slope is expressed as the fall in units vertical per units horizontal (percent) for a length of pipe.

[W] SMALL BUSINESS. Any business entity (including a sole proprietorship, corporation, partnership or other legal entity) which is owned and operated independently from all other businesses, which has the purpose of making a profit, and which has fifty or fewer employees.

[RB] SMOKE-DEVELOPED INDEX. A comparative measure, expressed as a dimensionless number, derived from measurements of smoke obscuration versus time for a material tested in accordance with ASTM E84 or UL 723.

[MP] SOIL STACK OR PIPE. A pipe that conveys sewage containing fecal material.

[RB] SOLAR ENERGY SYSTEM. A system that converts solar radiation to usable energy, including *photovoltaic panel systems* and *solar thermal systems*.

[S][RE] SOLAR HEAT GAIN COEFFICIENT (SHGC). For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[MP] SOLAR THERMAL COLLECTOR. Components in a *solar thermal system* that collect and convert solar radiation to thermal energy.

[MP] SOLAR THERMAL SYSTEM. A system that converts solar radiation to thermal energy for use in heating or cooling.

[RB] SOLID MASONRY. Load-bearing or nonload-bearing construction using masonry units where the net cross-sectional area of each unit in any plane parallel to the bearing surface is not less than 75 percent of its gross cross-sectional area. Solid masonry units shall conform to ASTM C55, C62, C73, C145 or C216.

[RB] SPLINE. A strip of wood structural panel cut from the same material used for the panel facings, used to connect two structural insulated panels. The strip (spline) fits into a groove cut into the vertical edges of the two structural insulated panels to be joined. Splines are used behind each facing of the structural insulated panels being connected as shown in Figure R610.8.

[MP] STACK. Any main vertical DWV line, including offsets, that extends one or more stories as directly as possible to its vent terminal.

[RB] STACK BOND. The placement of masonry units in a bond pattern is such that head joints in successive courses are vertically aligned. For the purpose of this code, requirements for stack bond shall apply to all masonry laid in other than running bond.

[MP] STACK VENT. The extension of soil or waste stack above the highest horizontal drain connected.

[RB] STAIR. A change in elevation, consisting of one or more risers.

[RB] STAIRWAY. One or more flights of stairs, either interior or exterior, with the necessary landings and connecting platforms to form a continuous and uninterrupted passage from one level to another within or attached to a building, porch or deck.

[RB] STAIRWAY, SPIRAL. A stairway with a plan view of closed circular form and uniform section-shaped treads radiating from a minimum-diameter circle.

[S][RE] STANDARD REFERENCE DESIGN. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] STANDARD TRUSS. Any construction that does not permit the roof-ceiling insulation to achieve the required *R*-value over the *exterior walls*.

[MP] STATIONARY FUEL CELL POWER PLANT. A self-contained package or factory-matched packages that constitute an automatically-operated assembly of integrated systems for generating useful electrical energy and recoverable thermal energy that is permanently connected and fixed in place.

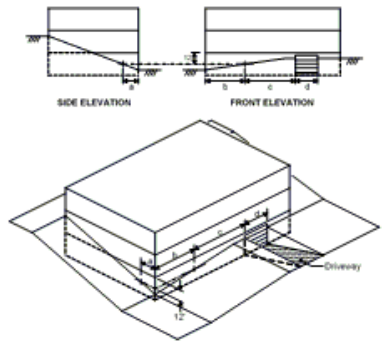
[MP] STORM SEWER, DRAIN. A pipe used for conveying rainwater, surface water, subsurface water and similar liquid waste.

[RB] STORY. That portion of a building included between the upper surface of a floor and the upper surface of the floor or roof next above.

[S][RB] STORY ABOVE GRADE PLANE. Any *story* having its finished floor surface entirely above *grade plane*, or in which the finished surface of the floor next above is either of the following:

1. More than 6 feet (1829 mm) *above grade plane.*
2. More than 12 feet (3658 mm) above the finished ground level at any point; or

3. More than 12 feet (3658 mm) above the finished ground level for more than 25 feet (7620 mm) of the perimeter. Required driveways up to 22 feet (6706 mm) shall not be considered in calculating the 25 foot distance if there is at least 10 feet (3048 mm) between the driveway and all portions of the 25-foot area. See Figure R202S.



a + b ≤ 25′
c ≥ 10′
d ≤ 22′

Lowest level may be a *basement* below grade if all these are met

Figure R202S
Story Above Grade Plane

[RB] STRUCTURAL COMPOSITE LUMBER. Structural members manufactured using wood elements bonded together with exterior adhesives.

Examples of structural composite lumber are:

Laminated strand lumber (LSL). A composite of wood strand elements with wood fibers primarily oriented along the length of the member, where the least dimension of the wood strand elements is 0.10 inch (2.54 mm) or less and their average lengths are not less than 150 times the least dimension of the wood strand elements.

Laminated veneer lumber (LVL). A composite of wood veneer elements with wood fibers primarily oriented along the length of the member, where the veneer element thicknesses are 0.25 inch (6.4 mm) or less.

Oriented strand lumber (OSL). A composite of wood strand elements with wood fibers primarily oriented along the length of the member, where the least dimension of the wood strand elements is 0.10 inch (2.54 mm) or less and their average lengths are not less than 75 times and less than 150 times the least dimension of the wood strand elements.

Parallel strand lumber (PSL). A composite of wood strand elements with wood fibers primarily oriented along the length of the member, where the least dimension of the wood strand elements is 0.25 inch (6.4 mm) or less and their average lengths are not less than 300 times the least dimension of the wood strand elements.

[RB] STRUCTURAL INSULATED PANEL (SIP). A structural sandwich panel that consists of a lightweight foam plastic core securely laminated between two thin, rigid wood structural panel facings.

[RB] STRUCTURE. That which is built or constructed.

[RB] SUBSOIL DRAIN. A drain that collects subsurface water or seepage water and conveys such water to a place of disposal.

[MP] SUMP. A tank or pit that receives sewage or waste, located below the normal *grade* of the gravity system and that must be emptied by mechanical means.

[MP] SUMP PUMP. A pump installed to empty a sump. These pumps are used for removing storm water only. The pump is selected for the specific head and volume of the load and is usually operated by level controllers.

[S][RB] SUNROOM. A one-story structure attached to a *dwelling* with a *glazing area* in excess of 40 percent of the gross area of the structure's *exterior walls* and roof.

For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[MP] SUPPLY AIR. Air delivered to a *conditioned space* through ducts or plenums from the heat exchanger of a heating, cooling or ventilating system.

[MP] SUPPORTS. Devices for supporting, hanging and securing pipes, fixtures and *equipment*.

[MP] SWEEP. A drainage fitting designed to provide a change in direction of a drain pipe of less than the angle specified by the amount necessary to establish the desired slope of the line. Sweeps provide a longer turning radius than bends and a less turbulent flow pattern (see "Bend" and "Elbow").

[MP] TEMPERATURE- AND PRESSURE-RELIEF (T AND P) VALVE. A combination relief valve designed to function as both a temperature-relief and pressure-relief valve.

[MP] TEMPERATURE-RELIEF VALVE. A temperature-actuated valve designed to discharge automatically at the temperature at which it is set.

[RB] TERMITE-RESISTANT MATERIAL. Pressure-preservative-treated wood in accordance with the AWPA standards in Section R317.1, naturally durable termite-resistant wood, steel, concrete, masonry or other *approved* material.

[S][RE] THERMAL ISOLATION. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RE] THERMAL RESISTANCE, *R*-VALUE. See "*R*-value."

[RE] THERMAL TRANSMITTANCE, *U*-FACTOR. See "*U*-factor."

[S][RE] THERMOSTAT. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[MP] THIRD-PARTY CERTIFICATION AGENCY. An approved agency operating a product or material certification system that incorporates initial product testing, assessment and surveillance of a manufacturer's quality control system.

[MP] THIRD-PARTY CERTIFIED. Certification obtained by the manufacturer indicating that the function and performance characteristics of a product or material have been determined by testing and ongoing surveillance by an approved third-party certification agency. Assertion of certification is in the form of identification in accordance with the requirements of the third-party certification agency.

[W][RB] TOWNHOUSE. A ((~~single family *dwelling unit* constructed in a group of~~)) *building* that contains three or more attached townhouse units. ((~~in which each unit extends from foundation to roof and with a *yard* or public way on not less than two sides.~~))

[W] TOWNHOUSE UNIT. A single-family dwelling unit in a townhouse that extends from foundation to roof and that has a yard or public way on not less than two sides that extends at least 50 percent of the length of each of these two sides.

[MP] TRAP. A fitting, either separate or built into a fixture, that provides a liquid seal to prevent the emission of sewer gases without materially affecting the flow of sewage or wastewater through it.

[MP] TRAP ARM. That portion of a *fixture drain* between a trap weir and the vent fitting.

[MP] TRAP PRIMER. A device or system of piping to maintain a water seal in a trap, typically installed where infrequent use of the trap would result in evaporation of the trap seal, such as floor drains.

[MP] TRAP SEAL. The trap seal is the maximum vertical depth of liquid that a trap will retain, measured between the crown weir and the top of the dip of the trap.

[RB] TRIM. Picture molds, chair rails, baseboards, handrails, door and window frames, and similar decorative or protective materials used in fixed applications.

[RB] TRUSS DESIGN DRAWING. The graphic depiction of an individual truss, that describes the design and physical characteristics of the truss.

[RB] TUBULAR DAYLIGHTING DEVICE (TDD). A nonoperable fenestration unit primarily designed to transmit daylight from a roof surface to an interior ceiling via a tubular conduit. The basic unit consists of an exterior glazed weathering surface, a light-transmitting tube with a reflective interior surface, and an interior-sealing device such as a translucent ceiling panel. The unit may be factory assembled, or field assembled from a manufactured kit.

[MP] TYPE L VENT. A *listed* and *labeled* vent conforming to UL 641 for venting oil-burning *appliances listed* for use with Type L vents or with gas *appliances listed* for use with Type B vents.

[S][RE] *U*-FACTOR (THERMAL TRANSMITTANCE). For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] UNDERLAYMENT. One or more layers of felt, sheathing paper, nonbituminous saturated felt, or other *approved* material over which a roof covering, with a slope of 2 to 12 (17-percent slope) or greater, is applied.

[S] UNSAFE. Structurally unsound, provided with inadequate egress, constituting a fire hazard, or otherwise dangerous to human life, or constituting a hazard to safety, health, or public welfare.

[MP] VACUUM BREAKER. A device that prevents back-siphonage of water by admitting atmospheric pressure through ports to the discharge side of the device.

[RB] VAPOR DIFFUSION PORT. A passageway for conveying water vapor from an unvented *attic* to the outside atmosphere.

[RB] VAPOR PERMEABLE. The property of having a moisture vapor permeance rating of 5 perms (2.9×10^{-10} kg/Pa • s • m^2) or greater, where tested in accordance with the desiccant method using Procedure A of ASTM E96. A vapor permeable material permits the passage of moisture vapor.

[RB] VAPOR RETARDER CLASS. A measure of the ability of a material or assembly to limit the amount of moisture that passes through that material or assembly. Vapor retarder class shall be defined using the desiccant method with Procedure A of ASTM E96 as follows:

Class I: ≤ 0.1 perm rating

Class II: > 0.1 to ≤ 1.0 perm rating

Class III: > 1.0 to ≤ 10 perm rating

[MP] VENT. A passageway for conveying flue gases from fuel-fired *appliances*, or their vent connectors, to the outside atmosphere.

[MP] VENT COLLAR. See "Flue collar."

[MP] VENT CONNECTOR. That portion of a venting system that connects the flue collar or draft hood of an *appliance* to a vent.

[MP] VENT DAMPER DEVICE, AUTOMATIC. A device intended for installation in the venting system, in the outlet of an individual, automatically operated fuel burning *appliance* and that is designed to open the venting system automatically where the *appliance* is in operation and to close off the venting system automatically where the *appliance* is in a standby or shutdown condition.

[MP] VENT GASES. Products of combustion from fuel-burning *appliances*, plus excess air and dilution air, in the venting system above the draft hood or draft regulator.

[MP] VENT STACK. A vertical vent pipe installed to provide circulation of air to and from the drainage system and that extends through one or more stories.

[MP] VENT SYSTEM. Piping installed to equalize pneumatic pressure in a drainage system to prevent trap seal loss or blowback due to siphonage or back pressure.

[S][RB] VENTILATION. The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, any space.

For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[S][RE] VENTILATION AIR. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[MP] VENTING. Removal of combustion products to the outdoors.

[MP] VENTING SYSTEM. A continuous open passageway from the flue collar of an *appliance* to the outside atmosphere for the purpose of removing flue or vent gases. A venting system is usually composed of a vent or a chimney and vent connector, if used, assembled to form the open passageway.

[MP] VERTICAL PIPE. Any pipe or fitting that makes an angle of 45 degrees (0.79 rad) or more with the horizontal.

[RB] VINYL SIDING. A shaped material, made principally from rigid polyvinyl chloride (PVC), that is used to cover exterior walls of buildings.

[S][RE] VISIBLE TRANSMITTANCE (VT). For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] WALL, RETAINING. A wall not laterally supported at the top, that resists lateral soil load and other imposed loads.

[RB] WALLS. Walls shall be defined as follows:

Load-bearing wall. A wall supporting any vertical load in addition to its own weight.

Nonbearing wall. A wall which does not support vertical loads other than its own weight.

[MP] WASTE. Liquidborne waste that is free of fecal matter.

[MP] WASTE PIPE OR STACK. Piping that conveys only liquid sewage not containing fecal material.

[MP] WASTE RECEPTOR. A floor sink, standpipe, hub drain or a floor drain that receives the discharge of one or more indirect waste pipes.

[MP] WATER DISTRIBUTION SYSTEM. Piping that conveys water from the service to the plumbing fixtures, *appliances*, appurtenances, *equipment*, devices or other systems served, including fittings and control valves.

[S][MP] WATER HEATER. Any heating *appliance* or *equipment* that heats potable water and supplies such water to the potable hot water distribution system, and includes only those *appliances* that do not exceed pressure of 160 pounds per square inch (1103 kPa), volume of 120 gallons (454 L) and a heat input of 200,000 Btu/hr (58.6 kW). *Appliances* and *equipment* that exceed these values are classified as boilers.

[MP] WATER MAIN. A water supply pipe for public use.

[MP] WATER OUTLET. A valved discharge opening, including a hose bibb, through which water is removed from the potable water system supplying water to a plumbing fixture or plumbing *appliance* that requires either an *air gap* or backflow prevention device for protection of the supply system.

[RB] WATER-RESISTIVE BARRIER. A material behind an *exterior wall* covering that is intended to resist liquid water that has penetrated behind the exterior covering from further intruding into the *exterior wall* assembly.

[MP] WATER SERVICE PIPE. The outside pipe from the water main or other source of potable water supply to the water distribution system inside the building, terminating at the service valve.

[MP] WATER SUPPLY SYSTEM. The water service pipe, the water-distributing pipes and the necessary connecting pipes, fittings, control valves and appurtenances in or adjacent to the building or premises.

[MP] WET VENT. A vent that receives the discharge of wastes from other fixtures.

[W][S][MP] WHOLE-HOUSE ((~~MECHANICAL~~)) VENTILATION SYSTEM. ((~~An exhaust system, supply~~)) A mechanical ventilation system, ((~~or combination thereof that is designed to mechanically exchange indoor air for outdoor air where operating continuously or through a programmed intermittent schedule to satisfy the whole house ventilation rate~~)) including fans, controls, and ducts, which replaces, by direct means, air from the habitable rooms with outdoor air.

For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

[RB] WINDBORNE DEBRIS REGION. Areas within *hurricane-prone regions* located in accordance with one of the following:

1. Within 1 mile (1.61 km) of the coastal mean high-water line where the ultimate design wind speed, V_{ult}, is 130 mph (58 m/s) or greater.
2. In areas where the ultimate design wind speed, V_{ult}, is 140 mph (63.6 m/s) or greater; or Hawaii.

[RB] WINDER. A tread with nonparallel edges.

[RB] WOOD STRUCTURAL PANEL. A panel manufactured from veneers; or wood strands or wafers; bonded together with waterproof synthetic resins or other suitable bonding systems. Examples of wood structural panels are plywood, orientated strand board (OSB) or composite panels.

[RB] YARD. An open space, other than a court, unobstructed from the ground to the sky, except where specifically provided by this code, on the *lot* on which a building is situated.

[S][RE] ZONE. For the definition applicable ((~~in Chapter 11~~)) to the *Seattle Residential Energy Code*, see ((~~Section N1101.6~~)) Section R202 in the residential section of the *Seattle Energy Code*.

CHAPTER 6

WALL CONSTRUCTION

User note:

About this chapter: *Chapter 6 contains prescriptive provisions for the design and construction of walls. The wall construction covered in Chapter 6 consists of five different types: wood framed, cold-formed steel framed, masonry, concrete and structural insulated panel (SIP). The primary concern of this chapter is the structural integrity of wall construction and transfer of all imposed loads to the supporting structure.*

SECTION R601
GENERAL

R601.1 Application. The provisions of this chapter shall control the design and construction of walls and partitions for buildings.

R601.2 Requirements. Wall construction shall be capable of accommodating all loads imposed in accordance with Section R301 and of transmitting the resulting loads to the supporting structural elements.

R601.2.1 Compressible floor-covering materials. Compressible floor-covering materials that compress more than 1/32 inch (0.8 mm) when subjected to 50 pounds (23 kg) applied over 1 inch square (645 mm) of material and are greater than 1/8 inch (3.2 mm) in thickness in the uncompressed state shall not extend beneath walls, partitions or columns, which are fastened to the floor.

SECTION R602
WOOD WALL FRAMING

R602.1 General. Wood and wood-based products used for load-supporting purposes shall conform to the applicable provisions of this section.

R602.1.1 Sawn lumber. Sawn lumber shall be identified by a grade mark of an accredited lumber grading or inspection agency and have design values certified by an accreditation body that complies with DOC PS 20. In lieu of a grade mark, a certification of inspection issued by a lumber grading or inspection agency meeting the requirements of this section shall be accepted.

[W] R602.1.1.1 Used sawn lumber. Used sawn lumber identified with a grade mark, in good condition and devoid of areas of decay shall be assumed to meet the requirements of Section 602.1.1 or shall comply with the following:

1. Dimensional lumber not identified with a grade mark that has a nominal thickness of 2 inches with a nominal width of 6 inches, or less, shall be assumed to be spruce-pine-fir stud grade and shall have structural properties assigned in accordance with current adopted standards. All other dimensional lumber shall be assumed to be hem-fir No. 2 grade and shall have structural properties assigned in accordance with current adopted standards.

R602.1.2 End-jointed lumber. Approved end-jointed lumber identified by a grade mark conforming to Section R602.1 shall be permitted to be used interchangeably with solid-sawn members of the same species and grade. End-jointed lumber used in an assembly required elsewhere in this code to have a fire-resistance rating shall have the designation “Heat Resistant Adhesive” or “HRA” included in its grade mark.

R602.1.3 Structural glued-laminated timbers. Glued- laminated timbers shall be manufactured and identified as required in ANSI A190.1, ANSI 117 and ASTM D3737.

R602.1.4 Structural log members. Structural log members shall comply with the provisions of ICC 400.

R602.1.5 Structural composite lumber. Structural capacities for structural composite lumber shall be established and monitored in accordance with ASTM D5456.

R602.1.6 Cross-laminated timber. Cross-laminated timber shall be manufactured and identified as required by ANSI/APA PRG 320.

R602.1.7 Engineered wood rim board. Engineered wood rim boards shall conform to ANSI/APA PRR 410 or shall be evaluated in accordance with ASTM D7672. Structural capacities shall be in accordance with either ANSI/APA PRR 410 or established in accordance with ASTM D7672. Rim boards conforming to ANSI/APA PRR 410 shall be marked in accordance with that standard.

[W] ((~~TABLE R602.7.5~~
~~MINIMUM NUMBER OF FULL-HEIGHT STUDS~~
~~AT EACH END OF HEADERS IN EXTERIOR WALLS~~~~[a]~~

~~MAXIMUM HEADER SPAN (feet)~~	~~ULTIMATE DESIGN WIND SPEED AND EXPOSURE CATEGORY~~	
	~~< 140 mph, Exposure B or < 130 mph, Exposure C~~	~~≤ 115 mph, Exposure B~~~~[b]~~
~~4~~	~~1~~	~~1~~
~~6~~	~~2~~	~~1~~
~~8~~	~~2~~	~~1~~
~~10~~	~~3~~	~~2~~
~~12~~	~~3~~	~~2~~
~~14~~	~~3~~	~~2~~
~~16~~	~~4~~	~~2~~
~~18~~	~~4~~	~~2~~

~~For SI: 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.~~

~~a. For header spans between those given, use the minimum number of full-height studs associated with the larger header span.~~

~~b. The tabulated minimum number of full-height studs is applicable where jack studs are provided to support the header at each end in accordance with Table R602.7(1). Where a framing anchor is used to support the header in lieu of a jack stud in accordance with Note d of Table R602.7(1), the minimum number of full-height studs at each end of a header shall be in accordance with requirements for wind speed < 140 mph, Exposure B.~~))

R602.8 Fireblocking required. Fireblocking shall be provided in accordance with Section R302.11.

[W] R602.9 Cripple walls. Foundation cripple walls shall be framed of studs not smaller than the studding above. Where exceeding 4 feet (1219 mm) in height, such walls shall be framed of studs having the size required for an additional *story*.

Cripple walls supporting bearing walls or exterior walls or interior braced wall panels as required in Sections R403.1.2 and R602.10.9.1 with a stud height less than 14 inches (356 mm) shall be continuously sheathed on one side with wood structural panels fastened to both the top and bottom plates in accordance with Table R602.3(1), or the cripple walls shall be constructed of solid blocking.

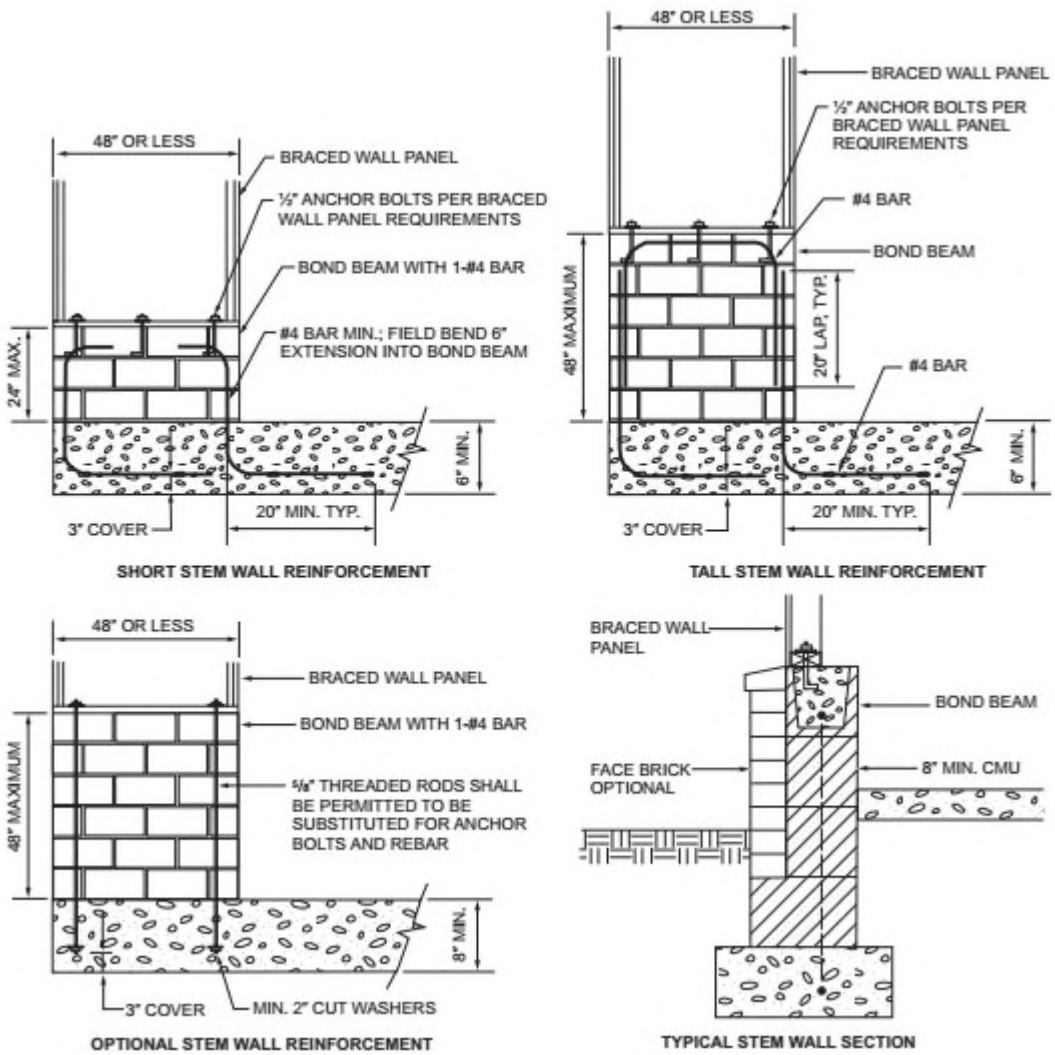
((~~Cripple~~)) All cripple walls shall be supported on continuous foundations.

Exception: Footings supporting *cripple walls* used to support interior *braced wall panels* as required in Sections R403.1.2 and R602.10.9.1 shall be continuous for the required length of the *cripple wall* and constructed beyond the *cripple wall* for a minimum distance of 4 inches and a maximum distance of the footing thickness. The footings extension is not required at intersections with other footings.

R602.10 Wall bracing. Buildings shall be braced in accordance with this section or, when applicable, Section R602.12. Where a building, or portion thereof, does not comply with one or more of the bracing requirements in this section, those portions shall be designed and constructed in accordance with Section R301.1.

R602.10.1 Braced wall lines. For the purpose of determining the amount and location of bracing required in each story level of a building, *braced wall lines* shall be designated as straight lines in the building plan placed in accordance with this section.

R602.10.1.1 Length of a braced wall line. The length of a *braced wall line* shall be the distance between its ends. The end of a *braced wall line* shall be the intersection with a perpendicular *braced wall line*, an angled *braced wall line* as permitted in Section R602.10.1.4 or an exterior wall as shown in Figure R602.10.1.1.



For SI: 1 inch = 25.4 mm.

FIGURE R602.10.9
MASONRY STEM WALLS SUPPORTING BRACED WALL PANELS

R602.10.9.1 Braced wall panel support for Seismic Design Categories D_0, D_1 and D_2. In Seismic Design Categories D_0, D_1 and D_2, braced wall panel footings shall be as specified in Section R403.1.2.

[W] R602.10.10 Cripple wall bracing. Cripple walls shall be constructed in accordance with Section R602.9 and braced in accordance with this section. Cripple walls supporting bearing walls or *exterior walls* or interior *braced wall panels* as required in Section R403.1.2 shall be braced with the length and method of bracing used for the wall above in accordance with Tables R602.10.3(1) and R602.10.3(3), and the applicable adjustment factors in Table R602.10.3(2) or R602.10.3(4), respectively, except that the length of cripple wall bracing shall be multiplied by a factor of 1.15. Where gypsum wall board is not used on the inside of the cripple wall bracing, the length adjustments for the elimination of the gypsum wallboard, or equivalent, shall be applied as directed in Tables R602.10.3(2) and R602.10.3(4) to the length of cripple wall bracing required. This adjustment shall be taken in addition to the 1.15 increase.

R602.10.10.1 Cripple wall bracing for Seismic Design Categories D_0 and D_1 and townhouses in Seismic Design Category C. In addition to the requirements in Section R602.10.10, the distance between adjacent edges of *braced wall panel*s for cripple walls along a *braced wall line* shall be 14 feet (4267 mm) maximum.

Where *braced wall lines* at interior walls are not supported on a continuous foundation below, the adjacent parallel cripple walls, where provided, shall be braced with Method WSP or Method CS-WSP in accordance with Section R602.10.4. The length of bracing required in accordance with Table R602.10.3(3) for the cripple walls shall be multiplied by 1.5. Where the cripple walls do not have sufficient length to provide the required bracing, the spacing of panel edge fas-

R607.5.2.2 Channel-type restraints. Glass unit masonry panels shall be recessed not less than 1 inch (25 mm) within channels and chases. Channel-type restraints shall be oversized to accommodate expansion material in the opening, packing and sealant between the framing restraints, and the glass unit masonry perimeter units.

R607.6 Sills. Before the bedding of glass units, the sill area shall be covered with a water-base asphaltic emulsion coating. The coating shall be not less than 1/8 inch (3 mm) thick.

R607.7 Expansion joints. Glass unit masonry panels shall be provided with expansion joints along the top and sides at all structural supports. Expansion joints shall be not less than 3/8 inch (10 mm) in thickness and shall have sufficient thickness to accommodate displacements of the supporting structure. Expansion joints shall be entirely free of mortar and other debris and shall be filled with resilient material.

R607.8 Mortar. Glass unit masonry shall be laid with Type S or N mortar. Mortar shall not be retempered after initial set. Mortar unused within 1-1/2 hours after initial mixing shall be discarded.

R607.9 Reinforcement. Glass unit masonry panels shall have horizontal joint reinforcement spaced not greater than 16 inches (406 mm) on center located in the mortar bed joint. Horizontal joint reinforcement shall extend the entire length of the panel but shall not extend across expansion joints. Longitudinal wires shall be lapped not less than 6 inches (152 mm) at splices. Joint reinforcement shall be placed in the bed joint immediately below and above openings in the panel. The reinforcement shall have not less than two parallel longitudinal wires of size W1.7 or greater, and have welded cross wires of size W1.7 or greater.

R607.10 Placement. Glass units shall be placed so head and bed joints are filled solidly. Mortar shall not be furrowed. Head and bed joints of glass unit masonry shall be 1/4 inch (6.4 mm) thick, except that vertical joint thickness of radial panels shall be not less than 1/8 inch (3 mm) or greater than 5/8 inch (16 mm). The bed joint thickness tolerance shall be minus 1/16 inch (1.6 mm) and plus 1/8 inch (3 mm). The head joint thickness tolerance shall be plus or minus 1/8 inch (3 mm).

SECTION R608
EXTERIOR CONCRETE WALL CONSTRUCTION

[W] R608.1 General. Exterior concrete walls shall be designed and constructed in accordance with the provisions of this section or in accordance with the provisions of PCA 100, ((~~or~~)) ACI 318, or ACI 332. Where PCA 100, ACI 318 or ACI 332, or the provisions of this section are used to design concrete walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for design, unless otherwise required by the state law of the jurisdiction having authority.

R608.1.1 Interior construction. These provisions are based on the assumption that interior walls and partitions, both load-bearing and nonload-bearing, floors and roof/ceiling assemblies are constructed of *light-framed construction* complying with the limitations of this code and the additional limitations of Section R608.2. Design and construction of light-framed assemblies shall be in accordance with the applicable provisions of this code. Where second-story exterior walls are of *light-framed construction*, they shall be designed and constructed as required by this code.

Aspects of concrete construction not specifically addressed by this code, including interior concrete walls, shall comply with ACI 318.

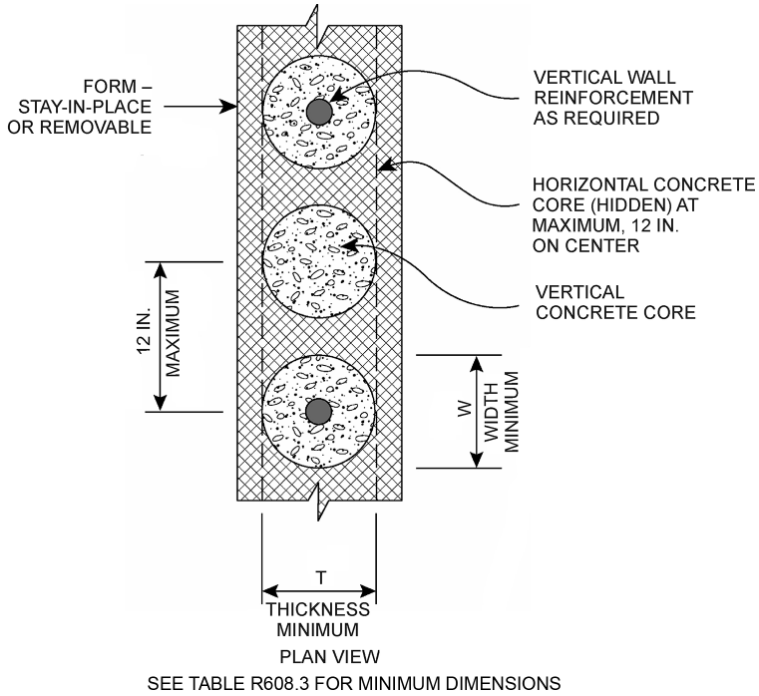
R608.1.2 Other concrete walls. Exterior concrete walls constructed in accordance with this code shall comply with the shapes and minimum concrete cross-sectional dimensions of Table R608.3. Other types of forming systems resulting in concrete walls not in compliance with this section shall be designed in accordance with ACI 318.

R608.2 Applicability limits. The provisions of this section shall apply to the construction of exterior concrete walls for buildings not greater than 60 feet (18 288 mm) in plan dimensions, floors with clear spans not greater than 32 feet (9754 mm) and roofs with clear spans not greater than 40 feet (12 192 mm). Buildings shall not exceed 35 feet (10 668 mm) in mean roof height or two stories in height above grade. Floor/ceiling dead loads shall not exceed 10 pounds per square foot (479 Pa), roof/ceiling dead loads shall not exceed 15 pounds per square foot (718 Pa) and *attic* live loads shall not exceed 20 pounds per square foot (958 Pa). Roof overhangs shall not exceed 2 feet (610 mm) of horizontal projection beyond the exterior wall and the dead load of the overhangs shall not exceed 8 pounds per square foot (383 Pa).

Walls constructed in accordance with the provisions of this section shall be limited to buildings subjected to a maximum design wind speed of 160 mph (72 m/s) Exposure B, 136 mph (61 m/s) Exposure C and 125 mph (56 m/s) Exposure D. Walls constructed in accordance with the provisions of this section shall be limited to detached one- and two-family *dwellings* and townhouses assigned to Seismic Design Category A or B, and detached one- and two-family *dwellings* assigned to Seismic Design Category C.

Buildings that are not within the scope of this section shall be designed in accordance with PCA 100 or ACI 318.

R608.3 Concrete wall systems. Concrete walls constructed in accordance with these provisions shall comply with the shapes and minimum concrete cross-sectional dimensions of Table R608.3.



For SI: 1 inch = 25.4 mm.

FIGURE R608.3(3)
SCREEN-GRID WALL SYSTEM

R608.4 Stay-in-place forms. Stay-in-place concrete forms shall comply with this section.

R608.4.1 Surface burning characteristics. The flame spread index and smoke-developed index of forming material, other than foam plastic, left exposed on the interior shall comply with Section R302.9. The surface burning characteristics of foam plastic used in insulating concrete forms shall comply with Section R316.3.

R608.4.2 Interior covering. Stay-in-place forms constructed of rigid foam plastic shall be protected on the interior of the building as required by Sections R316.4 and R702.3.4. Where gypsum board is used to protect the foam plastic, it shall be installed with a mechanical fastening system. Use of adhesives is permitted in addition to mechanical fasteners.

R608.4.3 Exterior wall covering. Stay-in-place forms constructed of rigid foam plastics shall be protected from sunlight and physical damage by the application of an *approved* exterior wall covering complying with this code. Exterior surfaces of other stay-in-place forming systems shall be protected in accordance with this code.

Requirements for installation of masonry veneer, stucco and other finishes on the exterior of concrete walls and other construction details not covered in this section shall comply with the requirements of this code.

R608.4.4 Flat ICF wall systems. Flat ICF wall system forms shall conform to ASTM E2634.

R608.5 Materials. Materials used in the construction of concrete walls shall comply with this section.

[W] R608.5.1 Concrete and materials for concrete. Materials used in concrete, and the concrete itself, shall conform to requirements of this section, PCA 100, ((~~or~~)) ACI 318, or ACI 332.

R608.5.1.1 Cements. The following standards as referenced in Chapter 44 shall be permitted to be used.

1. ASTM C150
2. ASTM C595
3. ASTM C1157

R608.5.1.2 Concrete mixing and delivery. Mixing and delivery of concrete shall comply with ASTM C94 or ASTM C685.

R608.5.1.3 Maximum aggregate size. The nominal maximum size of coarse aggregate shall not exceed one-fifth the narrowest distance between sides of forms, or three-fourths the clear spacing between reinforcing bars or between a bar and the side of the form.

1. For ceiling and roof systems of wood-framed construction, the provisions of Section R608.9.1 and the prescriptive details of Figures R608.9(9) and R608.9(10), where permitted by the tables accompanying those figures. Portions of connections of wood-framed ceiling and roof systems not noted in the figures shall be in accordance with Section R802, or AWC WFCM, if applicable. Wood framing members shall be of a species having a specific gravity equal to or greater than 0.42.
2. For ceiling and roof systems of cold-formed steel construction, the provisions of Section R608.9.1 and the prescriptive details of Figures R608.9(11) and R608.9(12), where permitted by the tables accompanying those figures. Portions of connections of cold-formed-steel framed ceiling and roof systems not noted in the figures shall be in accordance with Section R804, or AISI S230, if applicable.
3. Proprietary connectors selected to resist loads and load combinations in accordance with Appendix A (ASD) or Appendix B (LRFD) of PCA 100.
4. An engineered design using loads and load combinations in accordance with Appendix A (ASD) or Appendix B (LRFD) of PCA 100.
5. An engineered design using loads and material design provisions in accordance with this code, or in accordance with ASCE 7, ACI 318, and AWC NDS for wood-framed construction or AISI S100 for cold-formed steel-framed construction.

R608.10 Floor, roof and ceiling diaphragms. Floors and roofs in buildings with exterior walls of concrete shall be designed and constructed as diaphragms. Where gable-end walls occur, ceilings shall be designed and constructed as diaphragms. The design and construction of floors, roofs and ceilings of wood framing or cold-formed-steel framing serving as diaphragms shall comply with the applicable requirements of this code, or AWC WFCM or AISI S230, if applicable. Wood framing members shall be of a species having a specific gravity equal to or greater than 0.42.

SECTION R609
EXTERIOR WINDOWS AND DOORS

R609.1 General. This section prescribes performance and construction requirements for exterior windows and doors installed in walls. Windows and doors shall be installed and flashed in accordance with the fenestration manufacturer's written instructions. Window and door openings shall be flashed in accordance with Section R703.4. Written installation instructions shall be provided by the fenestration manufacturer for each window or door.

R609.2 Performance. Exterior windows and doors shall be capable of resisting the design wind loads specified in Table R301.2(2) adjusted for height and exposure in accordance with Table R301.2(3) or determined in accordance with ASCE 7 using the allowable stress design load combinations of ASCE 7. For exterior windows and doors tested in accordance with Sections R609.3 and R609.5, required design wind pressures determined from ASCE 7 using the ultimate strength design (USD) are permitted to be multiplied by 0.6. Design wind loads for exterior glazing not part of a labeled assembly shall be permitted to be determined in accordance with Chapter 24 of the *International Building Code*. Design wind loads for exterior glazing not part of a labeled assembly shall be permitted to be determined in accordance with Chapter 24 of the *International Building Code*.

[W] R609.3 Testing and labeling. Exterior windows and sliding doors shall be tested by an *approved* independent laboratory, and bear a *label* identifying manufacturer, performance characteristics and *approved* inspection agency to indicate compliance with AAMA/WDMA/CSA 101/I.S.2/A440. Exterior side-hinged doors shall be tested and *labeled* as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 or AMD 100, or comply with Section R609.5.

Exceptions:

1. Decorative glazed openings.
2. Custom exterior windows and doors manufactured by a small business shall be exempt from all testing requirements in Section R609 provided they meet the applicable provisions of Chapter 24 of the *International Building Code*.

R609.3.1 Comparative analysis. Structural wind load design pressures for window and door units different than the size tested in accordance with Section R609.3 shall be permitted to be different than the design value of the tested unit where determined in accordance with one of the following comparative analysis methods:

1. Structural wind load design pressures for window and door units smaller than the size tested in accordance with Section R609.3 shall be permitted to be higher than the design value of the tested unit provided such higher pressures are determined by accepted engineering analysis. Components of the smaller unit shall be the same as those of the tested unit. Where such calculated design pressures are used, they shall be validated by an additional test of the window or door unit having the highest allowable design pressure.
2. In accordance with WDMA I.S.11.

R609.4 Garage doors. Garage doors shall be tested in accordance with either ASTM E330 or ANSI/DASMA 108, and shall meet the acceptance criteria of ANSI/DASMA 108.

accordance with ASTM C1002 or bugle head style in accordance with ASTM C1513 and shall penetrate the steel not less than 3/8 inch (9.5 mm). Screws for attaching gypsum board and gypsum panel products to cold-formed steel framing 0.033 inch to 0.112 inch (1 mm to 3 mm) thick shall be in accordance with ASTM C954 or bugle head style in accordance with ASTM C1513. Screws for attaching gypsum board and gypsum panel products to structural insulated panels shall penetrate the wood structural panel facing not less than 7/16 inch (11.1 mm).

R702.3.6 Horizontal gypsum board diaphragm ceilings. Gypsum board and gypsum panel products shall be permitted on wood joists to create a horizontal *diaphragm* in accordance with Table R702.3.6. Gypsum board and gypsum panel products shall be installed perpendicular to ceiling framing members. End joints of adjacent courses of board and panels shall not occur on the same joist. The maximum allowable *diaphragm* proportions shall be 1-1/2:1 between shear resisting elements. Rotation or cantilever conditions shall not be permitted. Gypsum board or gypsum panel products shall not be used in *diaphragm* ceilings to resist lateral forces imposed by masonry or concrete construction. Perimeter edges shall be blocked using wood members not less than 2-inch by 6-inch (51 mm by 152 mm) nominal dimension. Blocking material shall be installed flat over the top plate of the wall to provide a nailing surface not less than 2 inches (51 mm) in width for the attachment of the gypsum board or gypsum panel product.

TABLE R702.3.6
SHEAR CAPACITY FOR HORIZONTAL WOOD-FRAMED GYPSUM BOARD DIAPHRAGM CEILING ASSEMBLIES

MATERIAL	THICKNESS OF MATERIAL (min.) (inch)	SPACING OF FRAMING MEMBERS (max.) (inch)	SHEAR VALUE[a, b] (plf of ceiling)	MINIMUM FASTENER SIZE[c, d]
Gypsum board or gypsum panel product	1/2	16 o.c.	90	5d cooler or wallboard nail; 1-5/8-inch long; 0.086-inch shank; 15/64-inch head
Gypsum board or gypsum panel product	1/2	24 o.c.	70	5d cooler or wallboard nail; 1-5/8-inch long; 0.086-inch shank; 15/64-inch head

For SI: 1 inch = 25.4 mm, 1 pound per linear foot = 1.488 kg/m.

a. Values are not cumulative with other horizontal diaphragm values and are for short-term loading caused by wind or seismic loading. Values shall be reduced 25 percent for normal loading.
b. Values shall be reduced 50 percent in Seismic Design Categories D_0, D_1, D_2 and E.
c. 1-1/4-inch, No. 6 Type S or W screws shall be permitted to be substituted for the listed nails.
d. Fasteners shall be spaced not more than 7 inches on center at all supports, including perimeter blocking, and not less than 3/8 inch from the edges and ends of the gypsum board.

R702.3.7 Water-resistant gypsum backing board. Gypsum board used as the base or backer for adhesive application of ceramic tile or other required nonabsorbent finish material shall conform to ASTM C1178, C1278 or C1396. Use of water-resistant gypsum backing board shall be permitted on ceilings. Water-resistant gypsum board shall not be installed over a Class I or II vapor retarder in a shower or tub compartment. Cut or exposed edges, including those at wall intersections, shall be sealed as recommended by the manufacturer.

R702.3.7.1 Limitations. Water-resistant gypsum backing board shall not be used where there will be direct exposure to water, or in areas subject to continuous high humidity.

R702.4 Ceramic tile.

R702.4.1 General. Ceramic tile surfaces shall be installed in accordance with ANSI A108.1, A108.4, A108.5, A108.6, A108.11, A118.1, A118.3, A136.1 and A137.1.

R702.4.2 Backer boards. Materials used as backers for wall tile in tub and shower areas and wall panels in shower areas shall be of materials listed in Table R702.4.2, and installed in accordance with the manufacturer's recommendations.

TABLE R702.4.2
BACKER BOARD MATERIALS

MATERIAL	STANDARD
Glass mat gypsum backing panel	ASTM C1178
Fiber-reinforced gypsum panels	ASTM C1278
Nonasbestos fiber-cement backer board	ASTM C1288 or ISO 8336, Category C
Nonasbestos fiber mat-reinforced cementitious backer units	ASTM C1325

[W] R702.5 Other finishes. Wood veneer paneling and hardboard paneling shall be placed on wood or cold-formed steel framing spaced not more than 16 inches (406 mm) on center. Wood veneer and hard board paneling less than 1/4-inch (6 mm) nominal thickness shall not have less than a 3/8-inch (10 mm) gypsum board or gypsum panel product backer. Wood veneer paneling not less than 1/4-inch (6 mm) nominal thickness shall conform to ANSI/HPVA HP-1. Hardboard paneling shall conform to

CPA/ANSI A135.5. All structural panel components within the *conditioned space* such as plywood, particle board, wafer board and oriented strand board shall be identified as "EXPOSURE 1" "EXTERIOR" or "HUD-APPROVED."

R702.6 Wood shakes and shingles. Wood shakes and shingles shall conform to CSSB *Grading Rules for Wood Shakes and Shingles* and shall be permitted to be installed directly to the studs with maximum 24 inches (610 mm) on-center spacing.

R702.6.1 Attachment. Nails, staples or glue are permitted for attaching shakes or shingles to the wall, and attachment of the shakes or shingles directly to the surface shall be permitted provided the fasteners are appropriate for the type of wall surface material. Where nails or staples are used, two fasteners shall be provided and shall be placed so that they are covered by the course above.

R702.6.2 Furring strips. Where furring strips are used, they shall be 1 inch by 2 inches or 1 inch by 3 inches (25 mm by 51 mm or 25 mm by 76 mm), spaced a distance on center equal to the desired exposure, and shall be attached to the wall by nailing through other wall material into the studs.

R702.7 Vapor retarders. Class I or II vapor retarders are required on the interior side of frame walls in Climate Zones 5, 6, 7, 8 and Marine 4.

Exceptions:

1. Basement walls.
2. Below-grade portion of any wall.
3. Construction where moisture or its freezing will not damage the materials.

R702.7.1 Class III vapor retarders. Class III vapor retarders shall be permitted where any one of the conditions in Table R702.7.1 is met.

TABLE R702.7.1
CLASS III VAPOR RETARDERS

CLIMATE ZONE	CLASS III VAPOR RETARDERS PERMITTED FOR:[a]
Marine 4	Vented cladding over wood structural panels. Vented cladding over fiberboard. Vented cladding over gypsum. Continuous insulation with *R*-value ≥ 2.5 over 2 × 4 wall. Continuous insulation with *R*-value ≥ 3.75 over 2 × 6 wall.
5	Vented cladding over wood structural panels. Vented cladding over fiberboard. Vented cladding over gypsum. Continuous insulation with *R*-value ≥ 5 over 2 × 4 wall. Continuous insulation with *R*-value ≥ 7.5 over 2 × 6 wall.
6	Vented cladding over fiberboard. Vented cladding over gypsum. Continuous insulation with *R*-value ≥ 7.5 over 2 × 4 wall. Continuous insulation with *R*-value ≥ 11.25 over 2 × 6 wall.
7 and 8	Continuous insulation with *R*-value ≥ 10 over 2 × 4 wall. Continuous insulation with *R*-value ≥ 15 over 2 × 6 wall.

For SI: 1 pound per cubic foot = 16 kg/m^3.

a. Spray foam with a maximum permeance of 1.5 perms at the installed thickness, applied to the interior cavity side of wood structural panels, fiberboard, insulating sheathing or gypsum is deemed to meet the continuous insulation requirement where the spray foam *R*-value meets or exceeds the specified continuous insulation *R*-value.

R702.7.2 Material vapor retarder class. The *vapor retarder class* shall be based on the manufacturer's certified testing or a tested assembly.

The following shall be deemed to meet the class specified:

1. Class I: Sheet polyethylene, on perforated aluminum foil.
2. Class II: Kraft-faced fiberglass batts.
3. Class III: Latex or enamel paint.

R702.7.3 Minimum clear airspaces and vented openings for vented cladding. For the purposes of this section, vented cladding shall include the following minimum clear airspaces. Other openings with the equivalent vent area shall be permitted.

1. Vinyl polypropylene or horizontal aluminum siding applied over a weather-resistive barrier as specified in Table R703.3(1).
2. Brick veneer with a clear airspace as specified in Table R703.8.4.
3. Other approved vented claddings.

SECTION R703
EXTERIOR COVERING

R703.1 General. Exterior walls shall provide the building with a weather-resistant exterior wall envelope. The exterior wall envelope shall include flashing as described in Section R703.4.

Exception: Log walls designed and constructed in accordance with the provisions of ICC 400.

[W] R703.1.1 Water resistance. The exterior wall envelope shall be designed and constructed in a manner that prevents the accumulation of water within the wall assembly by providing a water-resistant barrier behind the exterior cladding as required by Section R703.2 and a means of draining ((~~to the exterior~~)) water that penetrates the exterior cladding to the exterior. Protection against condensation in the *exterior wall* assembly shall be provided in accordance with Section R702.7 of this code.

Exceptions:

1. A weather-resistant exterior wall envelope shall not be required over concrete or masonry walls designed in accordance with Chapter 6 and flashed in accordance with Section R703.4 or R703.8.
2. Compliance with the requirements for a means of drainage, and the requirements of Sections R703.2 and R703.4, shall not be required for an exterior wall envelope that has been demonstrated to resist wind-driven rain through testing of the exterior wall envelope, including joints, penetrations and intersections with dissimilar materials, in accordance with ASTM E331 under the following conditions:
   - 2.1. Exterior wall envelope test assemblies shall include at least one opening, one control joint, one wall/eave interface and one wall sill. All tested openings and penetrations shall be representative of the intended end-use configuration.
   - 2.2. Exterior wall envelope test assemblies shall be at least 4 feet by 8 feet (1219 mm by 2438 mm) in size.
   - 2.3. Exterior wall assemblies shall be tested at a minimum differential pressure of 6.24 pounds per square foot (299 Pa).
   - 2.4. Exterior wall envelope assemblies shall be subjected to the minimum test exposure ((~~for a minimum~~)) duration of 2 hours.

   The exterior wall envelope design shall be considered to resist wind-driven rain where the results of testing indicate that water did not penetrate control joints in the exterior wall envelope, joints at the perimeter of openings penetration or intersections of terminations with dissimilar materials.
3. The requirement for a means of drainage shall not be construed to mean an air space cavity under the exterior cladding for an *exterior wall* clad with panel or lapped siding made of plywood, engineered wood, hardboard, or fiber cement. A water-resistive barrier as required by Section R703.2 will be required on *exterior walls.*

Interpretation R703.1.1: According to Section R703.1 exception 3, a rain-screen or similar construction method is not required for most exterior siding and cladding, and single-wall construction is allowed. Drainage methods are required to conform to the manufacturer's installation instructions and other sections of the *International Residential Code.*

Note: The "water-resistive barrier" behind the *exterior wall* covering provides drainage of the water that may enter an *exterior wall* envelope. If water penetrates the *exterior wall* covering, the felt paper or other *approved* material will direct the water to the bottom of the wall where it will escape to the exterior.

R703.1.2 Wind resistance. Wall coverings, backing materials and their attachments shall be capable of resisting wind loads in accordance with Tables R301.2(2) and R301.2(3). Wind-pressure resistance of the siding, soffit and backing materials shall be determined by ASTM E330 or other applicable standard test methods. Where wind-pressure resistance is determined by design analysis, data from approved design standards and analysis conforming to generally accepted engineering practice shall be used to evaluate the siding, soffit and backing material and its fastening. All applicable failure modes including bending rupture of siding, fastener withdrawal and fastener head pull-through shall be considered in the testing or design analysis. Where the wall covering, soffit and backing material resist wind load as an assembly, use of the design capacity of the assembly shall be permitted.

((~~**R703.2 Water-resistive barrier.** One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D226 for Type 1 felt or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. No.15 asphalt felt shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where~~

~~joints occur, felt shall be lapped not less than 6 inches (152 mm). Other *approved* materials shall be installed in accordance with the *water-resistive barrier* manufacturer's installation instructions. The No. 15 asphalt felt or other approved *water-resistive barrier* material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.~~))

[W] R703.2 Water-resistive barrier. Not fewer than one layer of water-resistive barrier shall be applied over studs or sheathing with flashing as indicated in Section R703.4, in such a manner as to provide a continuous water resistive barrier behind the exterior wall veneer. Water-resistive barrier materials shall comply with one of the following:

1. No. 15 felt complying with ASTM D226, Type 1.
2. ASTM E2556, Type 1 or 2.
3. ASTM E331 in accordance with Section R703.1.1; or
4. Other approved materials in accordance with the manufacturer's installation instructions.

R703.3 Wall covering nominal thickness and attachments. The nominal thickness and attachment of exterior wall coverings shall be in accordance with Table R703.3(1), the wall covering material requirements of this section, and the wall covering manufacturer's installation instructions. Cladding attachment over foam sheathing shall comply with the additional requirements and limitations of Sections R703.15 through R703.17. Nominal material thicknesses in Table R703.3(1) are based on a maximum stud spacing of 16 inches (406 mm) on center. Where specified by the siding manufacturer's instructions and supported by a test report or other documentation, attachment to studs with greater spacing is permitted. Fasteners for exterior wall coverings attached to wood framing shall be in accordance with Section R703.3.3 and Table R703.3(1). Exterior wall coverings shall be attached to cold-formed steel light frame construction in accordance with the cladding manufacturer's installation instructions, the requirements of Table R703.3(1) using screw fasteners substituted for the nails specified in accordance with Table R703.3(2), or an approved design.

1. Fasteners for horizontal aluminum siding, steel siding, particleboard panel siding, wood structural panel siding in accordance with ANSI/APA-PRP 210, fiber-cement panel siding and fiber-cement lap siding installed over foam plastic sheathing shall penetrate not less than 1-1/2 inches (38 mm) into framing or shall be in accordance with the manufacturer's installation instructions.
2. Fasteners for hardboard panel and lap siding shall penetrate not less than 1-1/2 inches (38 mm) into framing.
3. Fasteners for vinyl siding and insulated vinyl siding installed over wood or wood structural panel sheathing shall penetrate not less than 1-1/4 inches (32 mm) into sheathing and framing combined. Vinyl siding and insulated vinyl siding shall be permitted to be installed with fasteners penetrating into or through wood or wood structural sheathing of minimum thickness as specified by the manufacturer's instructions or test report, with or without penetration into the framing. Where the fastener penetrates fully through the sheathing, the end of the fastener shall extend not less than 1/4 inch (6.4 mm) beyond the opposite face of the sheathing. Fasteners for vinyl siding and insulated vinyl siding installed over foam plastic sheathing shall be in accordance with Section R703.11.2. Fasteners for vinyl siding and insulated vinyl siding installed over fiberboard or gypsum sheathing shall penetrate not less than 1-1/4 inches (32 mm) into framing.
4. Fasteners for vertical or horizontal wood siding shall penetrate not less than 1-1/2 inches (38 mm) into studs, studs and wood sheathing combined, or blocking.
5. Fasteners for siding material installed over foam plastic sheathing shall have sufficient length to accommodate foam plastic sheathing thickness and to penetrate framing or sheathing and framing combined, as specified in Items 1 through 4.

[W] R703.4 Flashing. Approved corrosion-resistant flashing shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. Self-adhered membranes used as flashing shall comply with AAMA 711. Fluid-applied membranes used as flashing in exterior walls shall comply with AAMA 714. The flashing shall extend to the surface of the exterior wall finish. Approved corrosion-resistant flashings shall be installed at the following locations:

1. Exterior window and door openings. Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier complying with Section 703.2 for subsequent drainage. Mechanically attached flexible flashings shall comply with AAMA 712. ((~~Flashing at exterior window and door openings shall be installed in accordance with one or more of the following:~~

   ~~1.1. The fenestration manufacturer's installation and flashing instructions, or for applications not addressed in the fenestration manufacturer's instructions, in accordance with the flashing manufacturer's instructions. Where flashing instructions or details are not provided, pan flashing shall be installed at the sill of exterior window and door openings. Pan flashing shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Openings using pan flashing shall incorporate flashing or protection at the head and sides.~~

   ~~1.2. In accordance with the flashing design or method of a registered design professional.~~

   ~~1.3. In accordance with other approved methods.~~))
2. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
3. Under and at the ends of masonry, wood or metal copings and sills.
4. Continuously above all projecting wood trim.
5. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
6. At wall and roof intersections.
7. At built-in gutters.

R703.5 Wood, hardboard and wood structural panel siding. Wood, hardboard, and wood structural panel siding shall be installed in accordance with this section and Table R703.3(1). Hardboard siding shall comply with CPA/ANSI A135.6. Hardboard siding used as architectural trim shall comply with CPA/ANSI A 135.7.

R703.5.1 Vertical wood siding. Wood siding applied vertically shall be nailed to horizontal nailing strips or blocking set not more than 24 inches (610 mm) on center.

R703.5.2 Panel siding. Three-eighths-inch (9.5 mm) wood structural panel siding shall not be applied directly to studs spaced more than 16 inches (406 mm) on center where long dimension is parallel to studs. Wood structural panel siding 7/16 inch (11.1 mm) or thinner shall not be applied directly to studs spaced more than 24 inches (610 mm) on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.

R703.8.4.1 Size and spacing. Veneer ties, if strand wire, shall be not less in thickness than No. 9 U.S. gage [(0.148 inch) (4 mm)] wire and shall have a hook embedded in the mortar joint, or if sheet metal, shall be not less than No. 22 U.S. gage by [(0.0299 inch) (0.76 mm)] 7/8 inch (22 mm) corrugated. Each tie shall support not more than 2.67 square feet (0.25 m^2) of wall area and shall be spaced not more than 32 inches (813 mm) on center horizontally and 24 inches (635 mm) on center vertically.

Exception: In Seismic Design Category D_0, D_1 or D_2 or townhouses in Seismic Design Category C or in wind areas of more than 30 pounds per square foot pressure (1.44 kPa), each tie shall support not more than 2 square feet (0.2 m^2) of wall area.

R703.8.4.1.1 Veneer ties around wall openings. Additional metal ties shall be provided around wall openings greater than 16 inches (406 mm) in either dimension. Metal ties around the perimeter of openings shall be spaced not more than 3 feet (9144 mm) on center and placed within 12 inches (305 mm) of the wall opening.

R703.8.4.2 Grout fill. As an alternative to the airspace required by Table R703.8.4, grout shall be permitted to fill the airspace. Where the airspace is filled with grout, a water-resistive barrier is required over studs or sheathing. Where the airspace is filled, replacing the sheathing and water-resistive barrier with a wire mesh and *approved* water-resistive barrier or an *approved* water-resistive barrier-backed reinforcement attached directly to the studs is permitted.

R703.8.5 Flashing. Flashing shall be located beneath the first course of masonry above finished ground level above the foundation wall or slab and at other points of support, including structural floors, shelf angles and lintels where masonry veneers are designed in accordance with Section R703.8. See Section R703.4 for additional requirements.

R703.8.6 Weepholes. Weepholes shall be provided in the outside wythe of masonry walls at a maximum spacing of 33 inches (838 mm) on center. Weepholes shall be not less than 3/16 inch (5 mm) in diameter. Weepholes shall be located immediately above the flashing.

R703.9 Exterior insulation and finish system (EIFS)/EIFS with drainage. Exterior insulation and finish systems (EIFS) shall comply with this chapter and Section R703.9.1. EIFS with drainage shall comply with this chapter and Section R703.9.2.

R703.9.1 Exterior insulation and finish systems (EIFS). EIFS shall comply with the following:

1. ASTM E2568.
2. EIFS shall be limited to applications over substrates of concrete or masonry wall assemblies.
3. Flashing of EIFS shall be provided in accordance with the requirements of Section R703.4.
4. EIFS shall be installed in accordance with the manufacturer's instructions.
5. EIFS shall terminate not less than 6 inches (152 mm) above the finished ground level.
6. Decorative trim shall not be face-nailed through the EIFS.

R703.9.2 Exterior insulation and finish system (EIFS) with drainage. EIFS with drainage shall comply with the following:

1. ASTM E2568.
2. EIFS with drainage shall be required over all wall assemblies with the exception of substrates of concrete or masonry wall assemblies.
3. EIFS with drainage shall have an average minimum drainage efficiency of 90 percent when tested in accordance with ASTM E2273.
4. The water-resistive barrier shall comply with Section R703.2 or ASTM E2570.
5. The water-resistive barrier shall be applied between the EIFS and the wall sheathing.
6. Flashing of EIFS with drainage shall be provided in accordance with the requirements of Section R703.4.
7. EIFS with drainage shall be installed in accordance with the manufacturer's instructions.
8. EIFS with drainage shall terminate not less than 6 inches (152 mm) above the finished ground level.
9. Decorative trim shall not be face-nailed through the EIFS with drainage.

R703.10 Fiber cement siding.

R703.10.1 Panel siding. Fiber-cement panels shall comply with the requirements of ASTM C1186, Type A, minimum Grade II or ISO 8336, Category A, minimum Class 2. Panels shall be installed with the long dimension either parallel or perpendicular to framing. Vertical and horizontal joints shall occur over framing members and shall be protected with caulking, or with battens or flashing, or be vertical or horizontal shiplap, or otherwise designed to comply with Section R703.1. Panel siding shall be installed with fasteners in accordance with Table R703.3(1) or the approved manufacturer's instructions.

[W] R703.10.2 Lap siding. Fiber-cement lap siding having a maximum width of 12 inches (305 mm) shall comply with the requirements of ASTM C1186, Type A, minimum Grade II or ISO 8336, Category A, minimum Class 2. Lap siding shall be lapped a minimum of 1 1/4 inches (32 mm) and lap siding ((~~not having tongue-and-groove end joints shall have the ends pro-~~

~~tected with caulking, covered with an H-section joint cover, located over a strip of flashing,~~)) shall be installed in accordance with the manufacturer's instructions or shall be designed to comply with Section R703.1. Lap siding courses shall be installed with the fastener heads exposed or concealed, in accordance with Table R703.3(1) or approved manufacturer's instructions.

R703.11 Vinyl siding. Vinyl siding shall be certified and *labeled* as conforming to the requirements of ASTM D3679 by an *approved* quality control agency.

R703.11.1 Installation. Vinyl siding, soffit and accessories shall be installed in accordance with the manufacturer's instructions.

R703.11.1.1 Fasteners. Unless specified otherwise by the manufacturer's instructions, fasteners for vinyl siding shall be 0.120-inch (3 mm) shank diameter nail with a 0.313-inch (8 mm) head or 16-gage staple with a 3/8-inch (9.5 mm) to 1/2-inch (12.7 mm) crown.

R703.11.1.2 Penetration depth. Unless specified otherwise by the manufacturer's instructions, fasteners shall penetrate into building framing. The total penetration into sheathing, furring framing or other nailable substrate shall be a minimum 1-1/4 inches (32 mm). Where specified by the manufacturer's instructions and supported by a test report, fasteners are permitted to penetrate into or fully through nailable sheathing or other nailable substrate of minimum thickness specified by the instructions or test report without penetrating into framing. Where the fastener penetrates fully through the sheathing, the end of the fastener shall extend a minimum of 1/4 inch (6.4 mm) beyond the opposite face of the sheathing or nailable substrate.

R703.11.1.3 Spacing. Unless specified otherwise by the manufacturer's instructions, the maximum spacing between fasteners for horizontal siding shall be 16 inches (406 mm), and for vertical siding 12 inches (305 mm) both horizontally and vertically. Where specified by the manufacturer's instructions and supported by a test report, greater fastener spacing is permitted.

R703.11.2 Installation over foam plastic sheathing. Where vinyl siding or insulated vinyl siding is installed over foam plastic sheathing, the vinyl siding shall comply with Section R703.11 and shall have a design wind pressure resistance in accordance with Table R703.11.2.

Exceptions:

1. Where the foam plastic sheathing is applied directly over wood structural panels, fiberboard, gypsum sheathing or other *approved* backing capable of independently resisting the design wind pressure, the vinyl siding shall be installed in accordance with Sections R703.3.3 and R703.11.1.
2. Where the vinyl siding manufacturer's product specifications provide an approved design wind pressure rating for installation over foam plastic sheathing, use of this design wind pressure rating shall be permitted and the siding shall be installed in accordance with the *manufacturer's installation instructions.*
3. Where the foam plastic sheathing and its attachment have a design wind pressure resistance complying with Sections R316.8 and R301.2.1, the vinyl siding shall be installed in accordance with Sections R703.3.3 and R703.11.1.

TABLE R703.11.2
ADJUSTED MINIMUM DESIGN WIND PRESSURE REQUIREMENT FOR VINYL SIDING

ULTIMATE DESIGN WIND SPEED (MPH)	ADJUSTED MINIMUM DESIGN WIND PRESSURE (ASD) (PSF)[a, b]					
	Case 1: With interior gypsum wallboard[c]			Case 2: Without interior gypsum wallboard[c]		
	Exposure			Exposure		
	B	C	D	B	C	D
110	-44.0	-61.6	-73.1	-62.9	-88.1	-104.4
115	-49.2	-68.9	-81.7	-70.3	-98.4	-116.7
120	-51.8	-72.5	-86.0	-74.0	-103.6	-122.8
130	-62.2	-87.0	-103.2	-88.8	-124.3	-147.4
> 130	Not Allowed[d]					

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

a. Linear interpolation is permitted.

b. The table values are based on a maximum 30-foot mean roof height, and effective wind area of 10 square feet Wall Zone 5 (corner), and the ASD design wind pressure from Table R301.2(2) multiplied by the following adjustment factors: 2.6 (Case 1) and 3.7 (Case 2) for wind speeds less than 130 mph and 3.7 (Case 2) for wind speeds greater than 130 mph.

c. Gypsum wallboard, gypsum panel product or equivalent.

d. For the indicated wind speed condition, foam sheathing only on the exterior of frame walls with vinyl siding is not allowed unless the vinyl siding complies with an adjusted minimum design wind pressure requirement as determined in accordance with Note b and the wall assembly is capable of resisting an impact without puncture at least equivalent to that of a wood frame wall with minimum 7/16-inch OSB sheathing as tested in accordance with ASTM E1886.

R806.2 Minimum vent area. The minimum net free ventilating area shall be 1/150 of the area of the vented space.

Exception: The minimum net free ventilation area shall be 1/300 of the vented space provided both of the following conditions are met:

1. In Climate Zones 6, 7 and 8, a Class I or II vapor retarder is installed on the warm-in-winter side of the ceiling.
2. Not less than 40 percent and not more than 50 percent of the required ventilating area is provided by ventilators located in the upper portion of the attic or rafter space. Upper ventilators shall be located not more than 3 feet (914 mm) below the ridge or highest point of the space, measured vertically. The balance of the required ventilation provided shall be located in the bottom one-third of the *attic* space. Where the location of wall or roof framing members conflicts with the installation of upper ventilators, installation more than 3 feet (914 mm) below the ridge or highest point of the space shall be permitted.

R806.3 Vent and insulation clearance. Where eave or cornice vents are installed, blocking, bridging and insulation shall not block the free flow of air. Not less than a 1-inch (25 mm) space shall be provided between the insulation and the roof sheathing and at the location of the vent.

R806.4 Installation and weather protection. Ventilators shall be installed in accordance with manufacturer's instructions. Installation of ventilators in roof systems shall be in accordance with the requirements of Section R903. Installation of ventilators in wall systems shall be in accordance with the requirements of Section R703.1.

[W] R806.5 Unvented attic and unvented enclosed rafter assemblies. Unvented *attics* and unvented enclosed roof framing assemblies created by ceilings that are applied directly to the underside of the roof framing members and structural roof sheathing applied directly to the top of the roof framing members/rafters, shall be permitted where all the following conditions are met:

1. The unvented *attic* space is completely within the *building thermal envelope*.
2. Interior Class I vapor retarders are not installed on the ceiling side (*attic* floor) of the unvented *attic* assembly or on the ceiling side of the unvented enclosed roof framing assembly.
3. Where wood shingles or shakes are used, a minimum 1/4-inch (6.4 mm) vented airspace separates the shingles or shakes and the roofing underlayment above the structural sheathing.
4. ((~~In Climate Zones 5, 6, 7 and 8, any~~)) Any *air-impermeable insulation* shall be a Class II vapor retarder, or shall have a Class II vapor retarder coating or covering in direct contact with the underside of the insulation.
5. Insulation shall comply with Item 5.3 and either Item 5.1 or 5.2:

   5.1. Item 5.1.1, 5.1.2, 5.1.3 or 5.1.4 shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.

   5.1.1. Where only *air-impermeable insulation* is provided, it shall be applied in direct contact with the underside of the structural roof sheathing.

   5.1.2. Where *air-permeable insulation* is installed directly below the structural sheathing, minimum R-10 rigid board or sheet insulation shall be installed directly above the structural roof sheathing ((~~in accordance with the *R*-values in Table R806.5~~)) for condensation control.

   5.1.3. Where both *air-impermeable* and *air-permeable insulation* are provided, ((~~the~~)) minimum R-10 *air-impermeable insulation* shall be applied in direct contact with the underside of the structural roof sheathing in accordance with Item 5.1.1 ((~~and shall be in accordance with the *R*-values in Table R806.5~~)) for condensation control. The *air-permeable insulation* shall be installed directly under the *air-impermeable insulation*.

   5.1.4. Alternatively, sufficient rigid board or sheet insulation shall be installed directly above the structural roof sheathing to maintain the monthly average temperature of the underside of the structural roof sheathing above 45°F (7°C). For calculation purposes, an interior air temperature of 68°F (20°C) is assumed and the exterior air temperature is assumed to be the monthly average outside air temperature of the three coldest months.

   5.2. In Climate Zones 1, 2 and 3, air-permeable insulation installed in unvented *attics* shall meet the following requirements:

   5.2.1. An approved *vapor diffusion port* shall be installed not more than 12 inches (305 mm) from the highest point of the roof, measured vertically from the highest point of the roof to the lower edge of the port.

   5.2.2. The port area shall be greater than or equal to 1:600 of the ceiling area. Where there are multiple ports in the attic, the sum of the port areas shall be greater than or equal to the area requirement.

   5.2.3. The vapor-permeable membrane in the *vapor diffusion port* shall have a vapor permeance rating of greater than or equal to 20 perms when tested in accordance with Procedure A of ASTM E96.

   5.2.4. The *vapor diffusion port* shall serve as an air barrier between the *attic* and the exterior of the building.

5.2.5. The *vapor diffusion port* shall protect the *attic* against the entrance of rain and snow.

5.2.6. Framing members and blocking shall not block the free flow of water vapor to the port. Not less than a 2-inch (51 mm) space shall be provided between any blocking and the roof sheathing. Air-permeable insulation shall be permitted within that space.

5.2.7. The roof slope shall be greater than or equal to 3:12 (vertical/horizontal).

5.2.8. Where only air-permeable insulation is used, it shall be installed directly below the structural roof sheathing.

5.2.9. *Air-impermeable insulation*, if any, shall be directly above or below the structural roof sheathing and is not required to meet the *R*-value in Table 806.5. Where directly below the structural roof sheathing, there shall be no space between the *air-impermeable insulation* and air-permeable insulation.

5.2.10. The air shall be supplied at a flow rate greater than or equal to 50 CFM (23.6 L/s) per 1,000 square feet (93 m^2) of ceiling. The air shall be supplied from ductwork providing supply air to the occupiable space when the conditioning system is operating. Alternatively, the air shall be supplied by a supply fan when the conditioning system is operating.

5.3. Where preformed insulation board is used as the air-impermeable insulation layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.

TABLE R806.5
INSULATION FOR CONDENSATION CONTROL

CLIMATE ZONE	MINIMUM RIGID BOARD ON AIR-IMPERMEABLE INSULATION *R*-VALUE[a, b]
2B and 3B tile roof only	0 (none required)
1, 2A, 2B, 3A, 3B, 3C	R-5
4C	R-10
4A, 4B	R-15
5	R-20
6	R-25
7	R-30
8	R-35

a. Contributes to but does not supersede the requirements in Section N1102.

b. Alternatively, sufficient continuous insulation shall be installed directly above the structural roof sheathing to maintain the monthly average temperature of the underside of the structural roof sheathing above 45°F (7°C). For calculation purposes, an interior air temperature of 68°F (20°C) is assumed and the exterior air temperature is assumed to be the monthly average outside air temperature of the three coldest months.

SECTION R807
ATTIC ACCESS

R807.1 Attic access. Buildings with combustible ceiling or roof construction shall have an *attic* access opening to *attic* areas that have a vertical height of 30 inches (762 mm) or greater over an area of not less than 30 square feet (2.8 m^2). The vertical height shall be measured from the top of the ceiling framing members to the underside of the roof framing members.

The rough-framed opening shall be not less than 22 inches by 30 inches (559 mm by 762 mm) and shall be located in a hallway or other location with *ready access*. Where located in a wall, the opening shall be not less than 22 inches wide by 30 inches high (559 mm wide by 762 mm high). Where the access is located in a ceiling, minimum unobstructed headroom in the *attic* space shall be 30 inches (762 mm) at some point above the access measured vertically from the bottom of ceiling framing members. See Section M1305.1.3 for access requirements where mechanical *equipment* is located in *attics*.

roof intersects a vertical sidewall. Where flashing is of metal, the metal shall be corrosion resistant with a thickness of not less than 0.019 inch (0.5 mm) (No. 26 galvanized sheet).

R903.2.2 Crickets and saddles. A cricket or saddle shall be installed on the ridge side of any chimney or penetration more than 30 inches (762 mm) wide as measured perpendicular to the slope. Cricket or saddle coverings shall be sheet metal or of the same material as the roof covering.

Exception: Unit skylights installed in accordance with Section R308.6 and flashed in accordance with the manufacturer's instructions shall be permitted to be installed without a cricket or saddle.

R903.3 Coping. Parapet walls shall be properly coped with noncombustible, weatherproof materials of a width not less than the thickness of the parapet wall.

R903.4 Roof drainage. Unless roofs are sloped to drain over roof edges, roof drains shall be installed at each low point of the roof.

[W] R903.4.1 Secondary (emergency overflow) drains or scuppers. Where roof drains are required, secondary emergency overflow ((~~roof~~)) drains or scuppers shall be provided where the roof perimeter construction extends above the roof in such a manner that water will be entrapped if the primary drains allow buildup for any reason. Overflow drains having the same size as the roof drains shall be installed with the inlet flow line located 2 inches (51 mm) above the low point of the roof, or overflow scuppers having three times the size of the roof drains and having a minimum opening height of 4 inches (102 mm) shall be installed in the adjacent parapet walls with the inlet flow located 2 inches (51 mm) above the low point of the roof served. The installation and sizing of overflow drains, leaders and conductors shall comply with Sections ((~~1106 and 1108~~)) 1101 and 1103 of the ((~~*International*~~)) *Uniform Plumbing Code*, as applicable.

Overflow drains shall discharge to an *approved* location. ((~~and shall not be connected to roof drain lines.~~))

SECTION R904
MATERIALS

R904.1 Scope. The requirements set forth in this section shall apply to the application of roof covering materials specified herein. Roof assemblies shall be applied in accordance with this chapter and the manufacturer's installation instructions. Installation of roof assemblies shall comply with the applicable provisions of Section R905.

R904.2 Compatibility of materials. Roof assemblies shall be of materials that are compatible with each other and with the building or structure to which the materials are applied.

R904.3 Material specifications and physical characteristics. Roof covering materials shall conform to the applicable standards listed in this chapter.

R904.4 Product identification. Roof covering materials shall be delivered in packages bearing the manufacturer's identifying marks and *approved* testing agency *labels* required. Bulk shipments of materials shall be accompanied by the same information issued in the form of a certificate or on a bill of lading by the manufacturer.

SECTION R905
REQUIREMENTS FOR ROOF COVERINGS

R905.1 Roof covering application. Roof coverings shall be applied in accordance with the applicable provisions of this section and the manufacturer's installation instructions. Unless otherwise specified in this section, roof coverings shall be installed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).

R905.1.1 Underlayment. *Underlayment* for asphalt shingles, clay and concrete tile, metal roof shingles, mineral-surfaced roll roofing, slate and slate-type shingles, wood shingles, wood shakes, metal roof panels and *photovoltaic shingles* shall conform to the applicable standards listed in this chapter. *Underlayment* materials required to comply with ASTM D226, D1970, D4869 and D6757 shall bear a label indicating compliance to the standard designation and, if applicable, type classification indicated in Table R905.1.1(1). *Underlayment* shall be applied in accordance with Table R905.1.1(2). *Underlayment* shall be attached in accordance with Table R905.1.1(3).

Exceptions:

1. As an alternative, self-adhering polymer-modified bitumen *underlayment* complying with ASTM D1970 installed in accordance with both the *underlayment* manufacturer's and roof covering manufacturer's instructions for the deck material, roof ventilation configuration and climate exposure for the roof covering to be installed, shall be permitted.
2. As an alternative, a minimum 4-inch-wide (102 mm) strip of self-adhering polymer-modified bitumen membrane complying with ASTM D1970, installed in accordance with the *manufacturer's installation instructions* for the deck material, shall be applied over all joints in the roof decking. An *approved underlayment* for the applicable roof

or foundation wall on all sides. Footings shall be founded on natural, undisturbed earth or engineered fill below frost depth. In areas not subjected to freezing, footings shall be not less than 12 inches (305 mm) below finished *grade*.

R1001.2.1 Ash dump cleanout. Cleanout openings located within foundation walls below fireboxes, where provided, shall be equipped with ferrous metal or masonry doors and frames constructed to remain tightly closed except when in use. Cleanouts shall be located to allow *access* so that ash removal will not create a hazard to combustible materials.

R1001.3 Seismic reinforcing. Masonry or concrete chimneys in Seismic Design Category D_0, D_1 or D_2 shall be reinforced. Reinforcing shall conform to the requirements set forth in Table R1001.1 and Section R606.

R1001.3.1 Vertical reinforcing. For chimneys up to 40 inches (1016 mm) wide, four No. 4 continuous vertical bars shall be placed between wythes of *solid masonry* or within the cells of hollow unit masonry and grouted in accordance with Section R606. Grout shall be prevented from bonding with the flue liner so that the flue liner is free to move with thermal expansion. For chimneys more than 40 inches (1016 mm) wide, two additional No. 4 vertical bars shall be provided for each additional flue incorporated into the chimney or for each additional 40 inches (1016 mm) in width or fraction thereof.

R1001.3.2 Horizontal reinforcing. Vertical reinforcement shall be placed within 1/4-inch (6.4 mm) ties, or other reinforcing of equivalent net cross-sectional area, placed in the bed joints in accordance with Section R606 at not less than every 18 inches (457 mm) of vertical height. Two such ties shall be installed at each bend in the vertical bars.

R1001.4 Seismic anchorage. Masonry or concrete chimneys in Seismic Design Category D_0, D_1 or D_2 shall be anchored at each floor, ceiling or roof line more than 6 feet (1829 mm) above *grade*, except where constructed completely within the exterior walls. Anchorage shall conform to the requirements of Section R1001.4.1.

R1001.4.1 Anchorage. Two 3/16-inch by 1-inch (5 mm by 25 mm) straps shall be embedded not less than 12 inches (305 mm) into the chimney. Straps shall be hooked around the outer bars and extend 6 inches (152 mm) beyond the bend. Each strap shall be fastened to not less than four floor ceiling or floor joists or rafters with two 1/2-inch (12.7 mm) bolts.

R1001.4.1.1 Cold-formed steel framing. Where cold-formed steel framing is used, the location where the 1/2-inch (12.7 mm) bolts are used to attach the straps to the framing shall be reinforced with not less than a 3-inch × 3-inch × 0.229-inch (76 mm × 76 mm × 5.8 mm) steel plate on top of the strap that is screwed to the framing with not fewer than seven No. 6 screws for each bolt.

R1001.5 Firebox walls. Masonry fireboxes shall be constructed of *solid masonry* units, hollow masonry units grouted solid, stone or concrete. Where a lining of firebrick not less than 2 inches (51 mm) thick or other *approved* lining is provided, the minimum thickness of back and sidewalls shall each be 8 inches (203 mm) of *solid masonry*, including the lining. The width of joints between firebricks shall not be greater than 1/4 inch (6.4 mm). Where a lining is not provided, the total minimum thickness of back and side walls shall be 10 inches (254 mm) of *solid masonry*. Firebrick shall conform to ASTM C27 or C1261 and shall be laid with medium- duty refractory mortar conforming to ASTM C199.

R1001.5.1 Steel fireplace units. Installation of steel fireplace units with *solid masonry* to form a masonry fireplace is permitted where installed either in accordance with the requirements of their listing or the requirements of this section. Steel fireplace units incorporating a steel firebox lining shall be constructed with steel not less than 1/4 inch (6.4 mm) thick, and an air-circulating chamber that is ducted to the interior of the building. The firebox lining shall be encased with *solid masonry* to provide a total thickness at the back and sides of not less than 8 inches (203 mm), of which not less than 4 inches (102 mm) shall be of *solid masonry* or concrete. Circulating air ducts used with steel fireplace units shall be constructed of metal or masonry.

R1001.6 Firebox dimensions. The firebox of a concrete or masonry fireplace shall have a depth of not less than 20 inches (508 mm). The throat shall be not less than 8 inches (203 mm) above the fireplace opening. The throat opening shall be not less than 4 inches (102 mm) deep. The cross-sectional area of the passageway above the firebox, including the throat, damper and smoke chamber, shall be not less than the cross-sectional area of the flue.

Exception: Rumford fireplaces shall be permitted provided that the depth of the fireplace is not less than 12 inches (305 mm) and not less than one-third of the width of the fireplace opening, that the throat is not less than 12 inches (305 mm) above the lintel and is not less than one-twentieth the cross-sectional area of the fireplace opening.

R1001.7 Lintel and throat. Masonry over a fireplace opening shall be supported by a lintel of noncombustible material. The minimum required bearing length on each end of the fireplace opening shall be 4 inches (102 mm). The fireplace throat or damper shall be located not less than 8 inches (203 mm) above the lintel.

[W] R1001.7.1 Damper. Masonry fireplaces shall be equipped with a ferrous metal damper located not less than 8 inches (203 mm) above the top of the fireplace opening. Dampers shall be installed in the fireplace or the chimney venting the fireplace, and shall be operable from the room containing the fireplace. Fireplaces shall be provided with each of the following:

1. Tightly fitting flue dampers, operated by a *readily accessible* manual or *approved* automatic control.

   Exception: Fireplaces with gas logs shall be installed in accordance with the *International Mechanical Code* Section 901, except that the standards for liquefied petroleum gas installations shall be NFPA 58 (*Liquefied Petroleum Gas Code*) and NFPA 54 (*National Fuel Gas Code*).

2. An outside source for *combustion air* ducted into the firebox. The duct shall be at least 6 square inches, and shall be provided with an operable outside air duct damper.
3. Site built fireplaces shall have tight-fitting glass or metal doors, or a flue draft induction fan or as *approved* for minimizing backdrafting. Factory built fireplaces shall use doors *listed* for the installed *appliance.*

R1001.8 Smoke chamber. Smoke chamber walls shall be constructed of *solid masonry* units, hollow masonry units grouted solid, stone or concrete. The total minimum thickness of front, back and side walls shall be 8 inches (203 mm) of *solid masonry*. The inside surface shall be parged smooth with refractory mortar conforming to ASTM C199. Where a lining of firebrick not less than 2 inches (51 mm) thick, or a lining of vitrified clay not less than 5/8 inch (16 mm) thick, is provided, the total minimum thickness of front, back and side walls shall be 6 inches (152 mm) of *solid masonry*, including the lining. Firebrick shall conform to ASTM C1261 and shall be laid with medium-duty refractory mortar conforming to ASTM C199. Vitrified clay linings shall conform to ASTM C315.

R1001.8.1 Smoke chamber dimensions. The inside height of the smoke chamber from the fireplace throat to the beginning of the flue shall not be greater than the inside width of the fireplace opening. The inside surface of the smoke chamber shall not be inclined more than 45 degrees (0.79 rad) from vertical where prefabricated smoke chamber linings are used or where the smoke chamber walls are rolled or sloped rather than corbeled. Where the inside surface of the smoke chamber is formed by corbeled masonry, the walls shall not be corbeled more than 30 degrees (0.52 rad) from vertical.

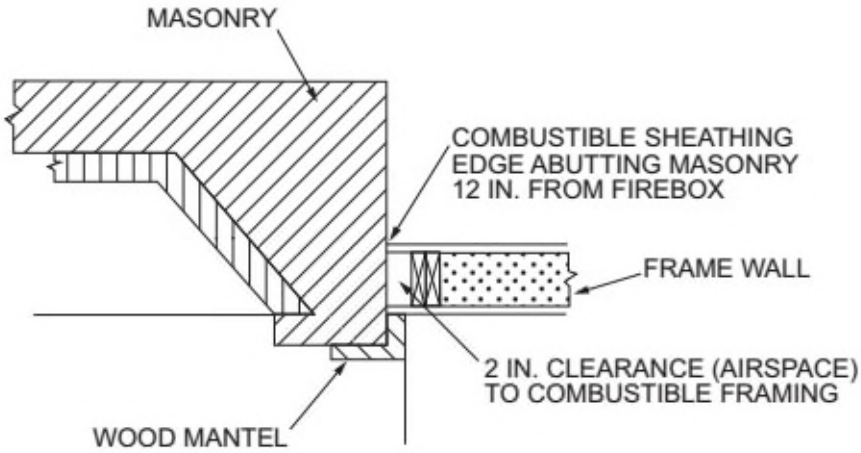
R1001.9 Hearth and hearth extension. Masonry fireplace hearths and hearth extensions shall be constructed of concrete or masonry, supported by noncombustible materials, and reinforced to carry their own weight and all imposed loads. Combustible material shall not remain against the underside of hearths and hearth extensions after construction.

R1001.9.1 Hearth thickness. The minimum thickness of fireplace hearths shall be 4 inches (102 mm).

R1001.9.2 Hearth extension thickness. The minimum thickness of hearth extensions shall be 2 inches (51 mm).

Exception: Where the bottom of the firebox opening is raised not less than 8 inches (203 mm) above the top of the hearth extension, a hearth extension of not less than 3/8-inch-thick (10 mm) brick, concrete, stone, tile or other *approved* noncombustible material is permitted.

R1001.10 Hearth extension dimensions. Hearth extensions shall extend not less than 16 inches (406 mm) in front of and not less than 8 inches (203 mm) beyond each side of the fireplace opening. Where the fireplace opening is 6 square feet (0.6 m^2) or larger, the hearth extension shall extend not less than 20 inches (508 mm) in front of and not less than 12 inches (305 mm) beyond each side of the fireplace opening.



For SI: 1 inch = 25.4 mm.

FIGURE R1001.11
CLEARANCE FROM COMBUSTIBLES

R1001.11 Fireplace clearance. Wood beams, joists, studs and other combustible material shall have a clearance of not less than 2 inches (51 mm) from the front faces and sides of masonry fireplaces and not less than 4 inches (102 mm) from the back faces of masonry fireplaces. The airspace shall not be filled, except to provide fireblocking in accordance with Section R1001.12.

Exceptions:

1. Masonry fireplaces *listed* and *labeled* for use in contact with combustibles in accordance with UL 127 and installed in accordance with the manufacturer's instructions are permitted to have combustible material in contact with their exterior surfaces.

2. Where masonry fireplaces are part of masonry or concrete walls, combustible materials shall not be in contact with the masonry or concrete walls less than 12 inches (306 mm) from the inside surface of the nearest firebox lining.
3. Exposed combustible trim and the edges of sheathing materials such as wood siding, flooring and gypsum board shall be permitted to abut the masonry fireplace sidewalls and hearth extension in accordance with Figure R1001.11, provided such combustible trim or sheathing is not less than 12 inches (305 mm) from the inside surface of the nearest firebox lining.
4. Exposed combustible mantels or trim is permitted to be placed directly on the masonry fireplace front surrounding the fireplace opening providing such combustible materials are not placed within 6 inches (152 mm) of a fireplace opening. Combustible material within 12 inches (306 mm) of the fireplace opening shall not project more than 1/8 inch (3 mm) for each 1-inch (25 mm) distance from such an opening.

R1001.12 Fireplace fireblocking. Fireplace fireblocking shall comply with the provisions of Section R602.8.

SECTION R1002
MASONRY HEATERS

R1002.1 Definition. A masonry heater is a heating *appliance* constructed of concrete or *solid masonry*, hereinafter referred to as masonry, that is designed to absorb and store heat from a solid-fuel fire built in the firebox by routing the exhaust gases through internal heat exchange channels in which the flow path downstream of the firebox includes flow in a horizontal or downward direction before entering the chimney and that delivers heat by radiation from the masonry surface of the heater.

[W] R1002.2 Installation. Masonry heaters shall be installed in accordance with this section and shall be a masonry heater type *approved* by the Department of Ecology. Masonry heaters shall comply with one of the following:

1. Masonry heaters shall comply with the requirements of ASTM E1602.
2. Masonry heaters shall be *listed* and *labeled* in accordance with UL 1482 or CEN 15250 and installed in accordance with the manufacturer's instructions.

[W] R1002.2.1 Combustion air and doors. Masonry heaters shall be provided with both of the following:

1. Primary *combustion air* ducted from the outside of the structure to the *appliance.*
2. Tight fitting ceramic glass or metal doors. Flue dampers, when provided, shall have an external control and when in the closed position shall have a net free area of not less than 5% of the flue cross sectional area.

R1002.3 Footings and foundation. The firebox floor of a masonry heater shall be a minimum thickness of 4 inches (102 mm) of noncombustible material and be supported on a noncombustible footing and foundation in accordance with Section R1003.2.

R1002.4 Seismic reinforcing. In Seismic Design Categories D_0, D_1 and D_2, masonry heaters shall be anchored to the masonry foundation in accordance with Section R1003.3. Seismic reinforcing shall not be required within the body of a masonry heater whose height is equal to or less than 3.5 times its body width and where the masonry chimney serving the heater is not supported by the body of the heater. Where the masonry chimney shares a common wall with the facing of the masonry heater, the chimney portion of the structure shall be reinforced in accordance with Section R1003.

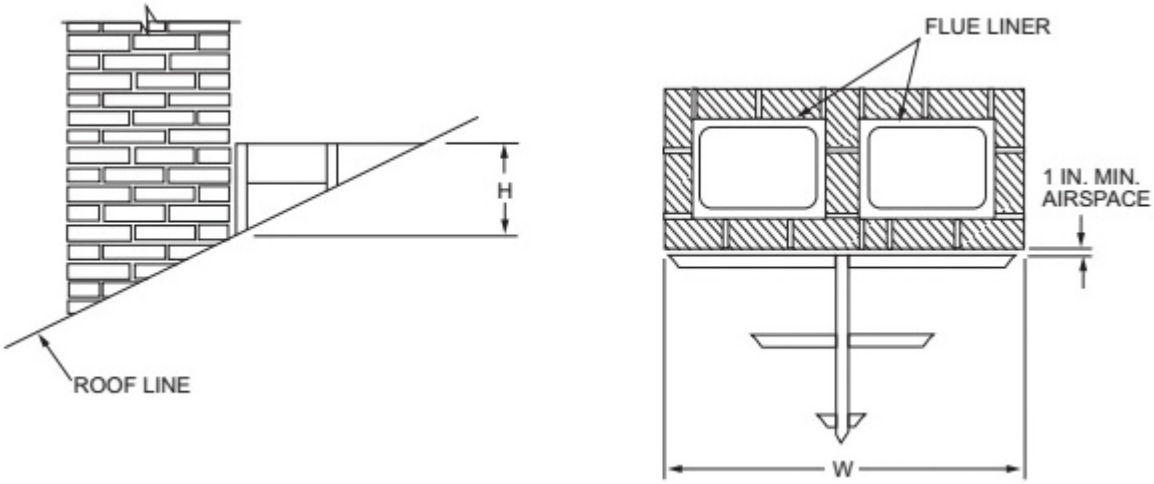
R1002.5 Masonry heater clearance. Combustible materials shall not be placed within 36 inches (914 mm) of the outside surface of a masonry heater in accordance with NFPA 211 Section 8-7 (clearances for solid-fuel-burning *appliances*), and the required space between the heater and combustible material shall be fully vented to permit the free flow of air around all heater surfaces.

Exceptions:

1. Where the masonry heater wall is not less than 8 inches (203 mm) thick of *solid masonry* and the wall of the heat exchange channels is not less than 5 inches (127 mm) thick of *solid masonry*, combustible materials shall not be placed within 4 inches (102 mm) of the outside surface of a masonry heater. A clearance of not less than 8 inches (203 mm) shall be provided between the gas-tight capping slab of the heater and a combustible ceiling.
2. Masonry heaters listed and labeled in accordance with UL 1482 or CEN 15250 shall be installed in accordance with the listing specifications and the manufacturer's written instructions.

SECTION R1003
MASONRY CHIMNEYS

R1003.1 Definition. A masonry chimney is a chimney constructed of *solid masonry* units, hollow masonry units grouted solid, stone or concrete, hereinafter referred to as masonry. Masonry chimneys shall be constructed, anchored, supported and reinforced as required in this chapter.



For SI: 1 inch = 25.4 mm.

FIGURE R1003.20
CHIMNEY CRICKET

SECTION R1004
FACTORY-BUILT FIREPLACES

[W] R1004.1 General. Factory-built fireplaces shall be *listed* and *labeled* and shall be installed in accordance with the conditions of the *listing*. Factory-built fireplaces shall be tested in accordance with UL 127.

[W] R1004.1.1 Emission Standards for Factory-built Fireplaces. No new or used factory-built fireplace shall be installed in Washington state unless it is certified and *labeled* in accordance with procedures and criteria specified in ASTM E2558 Standard Test Method for determining particulate matter emission from fires in low mass wood burning fireplaces.

To certify an entire fireplace model line, the internal assembly shall be tested to determine its particulate matter emission performance. Retesting and recertifying is required if the design and construction specifications of the fireplace model line internal assembly change. Testing for certification shall be performed by a Washington state Department of Ecology (DOE) *approved* and U.S. Environmental Protection Agency (EPA) accredited laboratory.

[W] R1004.1.2 Emission Standards for Certified Masonry and Concrete Fireplaces. Masonry and concrete fireplace model lines certified to *Washington State Building Code* Standard 31-2 prior to July 1, 2013, may retain certification provided the design and construction specifications of the fireplace model line internal assembly do not change.

R1004.2 Hearth extensions. Hearth extensions of *approved* factory-built fireplaces shall be installed in accordance with the *listing* of the fireplace. The hearth extension shall be readily distinguishable from the surrounding floor area. Listed and labeled hearth extensions shall comply with UL 1618.

R1004.3 Decorative shrouds. Decorative shrouds shall not be installed at the termination of chimneys for factory-built fireplaces except where the shrouds are listed and *labeled* for use with the specific factory-built fireplace system and installed in accordance with the manufacturer's instructions.

R1004.4 Unvented gas log heaters. An unvented gas log heater shall not be installed in a factory-built fireplace unless the fireplace system has been specifically tested, *listed* and *labeled* for such use in accordance with UL 127.

R1004.5 Gasketed fireplace doors. A gasketed fireplace door shall not be installed on a factory-built fireplace except where the fireplace system has been specifically tested, *listed* and *labeled* for such use in accordance with UL 127.

SECTION R1005
FACTORY-BUILT CHIMNEYS

R1005.1 Listing. *Factory-built chimneys* shall be *listed* and *labeled* and shall be installed and terminated in accordance with the *manufacturer's installation instructions*.

R1005.2 Decorative shrouds. Decorative shrouds shall not be installed at the termination of *factory-built chimneys* except where the shrouds are *listed* and *labeled* for use with the specific *factory-built chimney* system and installed in accordance with the *manufacturer's installation instructions*.

R1005.3 Solid-fuel appliances. *Factory-built chimneys* installed in *dwelling units* with solid-fuel-burning *appliances* shall comply with the Type HT requirements of UL 103 and shall be marked "Type HT" and "Residential Type and Building Heating Appliance Chimney."

Exception: *Chimneys* for use with open combustion chamber fireplaces shall comply with the requirements of UL 103 and shall be marked "Residential Type and Building Heating Appliance Chimney."

Chimneys for use with open combustion chamber *appliances* installed in buildings other than *dwelling units* shall comply with the requirements of UL 103 and shall be marked "Building Heating Appliance Chimney" or "Residential Type and Building Heating Appliance Chimney."

R1005.4 Factory-built fireplaces. *Chimneys* for use with factory-built fireplaces shall comply with the requirements of UL 127.

R1005.5 Support. Where *factory-built chimneys* are supported by structural members, such as joists and rafters, those members shall be designed to support the additional load.

R1005.6 Medium-heat appliances. *Factory-built chimneys* for medium-heat *appliances* producing flue gases having a temperature above 1,000°F (538°C), measured at the entrance to the *chimney*, shall comply with UL 959.

R1005.7 Factory-built chimney offsets. Where a *factory-built chimney* assembly incorporates offsets, no part of the *chimney* shall be at an angle of more than 30 degrees (0.52 rad) from vertical at any point in the assembly and the chimney assembly shall not include more than four elbows.

R1005.8 Insulation shield. Where *factory-built chimneys* pass through insulated assemblies, an insulation shield constructed of steel having a thickness of not less than 0.0187 inch (0.4712 mm) (No. 26 gage) shall be installed to provide clearance between the *chimney* and the insulation material. The clearance shall be not less than the clearance to combustibles specified by the chimney *manufacturer's installation instructions*. Where *chimneys* pass through attic space, the shield shall terminate not less than 2 inches (51 mm) above the insulation materials and shall be secured in place to prevent displacement. Insulation shields provided as part of a *listed* chimney system shall be installed in accordance with the manufacturer's installation instructions.

SECTION R1006
EXTERIOR AIR SUPPLY

R1006.1 Exterior air. Factory-built or masonry fireplaces covered in this chapter shall be equipped with an exterior air supply to ensure proper fuel combustion unless the room is mechanically ventilated and controlled so that the indoor pressure is neutral or positive.

[W] ((~~R1006.1.1 Factory-built fireplaces.~~ ~~Exterior *combustion air* ducts for factory-built fireplaces shall be a *listed* component of the fireplace and shall be installed in accordance with the fireplace manufacturer's instructions.~~))

[W] ((~~R1006.1.2 Masonry fireplaces.~~ ~~*Listed combustion air* ducts for masonry fireplaces shall be installed in accordance with the terms of their *listing* and the manufacturer's instructions.~~))

[W] ((~~R1006.2 Exterior air intake.~~ ~~The exterior air intake shall be capable of supplying all *combustion air* from the exterior of the *dwelling* or from spaces within the *dwelling* ventilated with outdoor air such as nonmechanically ventilated crawl or *attic* spaces. The exterior air intake shall not be located within the garage or basement of the dwelling. The exterior air intake, for other than listed factory-built fireplaces, shall not be located at an elevation higher than the firebox. The exterior air intake shall be covered with a corrosion-resistant screen of 1/4-inch (6.4 mm) mesh.~~))

[W] R1006.2 Solid fuel burning appliances and fireplaces. Solid-fuel-burning *appliances* and fireplaces shall be provided with tight-fitting metal or ceramic glass doors, and:

1. A source from outside the structure of primary *combustion air*, connected to the *appliance* as per manufacturer's specification. The air inlet shall originate at a point below the fire box. The duct shall be 4 inches or greater in diameter, not exceed 20 feet in length, and be installed as per manufacturer's instructions; or
2. The *appliance* and manufacturer's recommended *combustion air* supply, as an installed unit, shall be certified by an independent testing laboratory to have passed Test No. 11-Negative Pressure Test, Section 12.3, of ULC S627-M1984 "Space Heaters for Use with Solid Fuels," modified as follows:
   - 2.1 Negative pressure of 8 Pascal shall be initially established with the chamber sealed and the air supply, if not directly connected to the *appliance*, closed off.
   - 2.2 The air supply if not directly connected to the *appliance*, shall then be opened.
   - 2.3 The maximum allowable air exchange rate from chamber leakage and intentional air supply for the unit (*appliance* with *combustion air* supply) in the test chamber is 3.5 air changes per hour, or 28 cfm (cubic feet of air per minute), whichever is less.

Exception: *Combustion air* may be supplied to the room in which the solid-fuel-burning *appliance* is located in lieu of direct ducting, provided that one of the following conditions is met:

1. The solid-fuel-burning *appliance* is part of a central heating plant and installed in an un*conditioned space* in conformance with the *International Mechanical Code;* or
2. The solid-fuel-burning *appliance* is installed in existing construction directly on a concrete floor or surrounded by masonry materials as in a fireplace. The *combustion air* terminus shall be located as close to the solid fuel burning *appliance* as possible and shall be provided with a barometric damper or equivalent. The *combustion air* source shall be specified by the manufacturer or no less than 4 inches in diameter or the equivalent in area or as *approved.*

R1006.3 Clearance. Unlisted *combustion air* ducts shall be installed with a minimum 1-inch (25 mm) clearance to combustibles for all parts of the duct within 5 feet (1524 mm) of the duct outlet.

[W] ((~~R1006.4 Passageway.~~ ~~The *combustion air* passageway shall be not less than 6 square inches (3870 mm^2) and not more than 55 square inches (0.035 m^2), except that *combustion air* systems for listed fireplaces shall be constructed in accordance with the fireplace manufacturer's instructions.~~)) RESERVED

R1006.5 Outlet. The exterior air outlet shall be located in the back or side of the firebox chamber or shall be located outside of the firebox, at the level of the hearth and not greater than 24 inches (610 mm) from the firebox opening. The outlet shall be closable and designed to prevent burning material from dropping into concealed combustible spaces.

Part IV—Energy Conservation

CHAPTER 11 [RE]

ENERGY EFFICIENCY

Chapter 11 is not adopted by The City of Seattle. See *Seattle Energy Conservation Code*.

Part V—Mechanical

CHAPTER 12

MECHANICAL ADMINISTRATION

User notes:

About this chapter: *Chapter 12 supplements Chapter 1 and establishes the scope of coverage for Chapters 13 through 24. The applicability of code provisions to existing mechanical systems and appliances is established herein.*

Code development reminder: *Code change proposals to this chapter will be considered by the IRC—Plumbing/Mechanical Code Development Committee during the 2018 (Group A) Code Development Cycle. See explanation on page iv.*

SECTION M1201
GENERAL

[W] M1201.1 Scope. The provisions of Chapters 12 through 24 shall regulate the design, installation, maintenance, *alteration* and inspection of mechanical systems that are permanently installed and used to control environmental conditions within buildings. These chapters shall also regulate those mechanical systems, system components, *equipment* and *appliances* specifically addressed in this code.

Exception: The standards for liquefied petroleum gas installations shall be NFPA 58 (*Liquefied Petroleum Gas Code*) and ANSI Z223.1/NFPA 54 (*National Fuel Gas Code*).

M1201.2 Application. In addition to the general administration requirements of Chapter 1, the administrative provisions of this chapter shall apply to the mechanical requirements of Chapters 13 through 24.

[W] M1201.3 Construction documents. The plans and specifications shall show in sufficient detail pertinent data and features of the materials, *equipment* and systems as herein governed including, but not limited to: design criteria, size and type of apparatus and *equipment*, systems and *equipment* controls, provisions for *combustion air* to fuel-burning *appliances*, and other pertinent data to indicate conformance with the requirements of this code.

[W] M1201.4 Testing. At the discretion of the *building official*, flow testing may be required to verify that the mechanical system satisfies the requirements of this code. Specific testing required by other sections of this code shall be performed. Flow testing may be performed using flow hoods measuring at the intake or exhaust points of the system, in-line pitot tube, or pitot-traverse type measurement systems in the duct, short-term tracer gas measurements, or other means *approved* by the *building official*.

SECTION M1202
EXISTING MECHANICAL SYSTEMS

M1202.1 Additions, alterations or repairs. *Additions*, *alterations*, renovations or repairs to a mechanical system shall conform to the requirements for a new mechanical system without requiring the existing mechanical system to comply with all of the requirements of this code. *Additions*, *alterations* or repairs shall not cause an existing mechanical system to become unsafe, hazardous or overloaded. Minor *additions*, *alterations* or repairs to existing mechanical systems shall meet the provisions for new construction, unless such work is done in the same manner and arrangement as was in the existing system, is not hazardous, and is *approved*.

M1202.2 Existing installations. Except as otherwise provided for in this code, a provision in this code shall not require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing mechanical system lawfully in existence at the time of the adoption of this code.

M1202.3 Maintenance. Mechanical systems, both existing and new, and parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe and sanitary condition. Devices or safeguards that are required by this code shall be maintained in compliance with the code edition under which such devices and safeguards were installed. The owner or the owner's designated agent shall be responsible for maintenance of the mechanical systems. To determine compliance with this provision, the *building official* shall have the authority to require a mechanical system to be reinspected.

imum clearances greater than 12 inches (305 mm), Table M1306.2 shall not be used to reduce the clearance to less than 12 inches (305 mm).

SECTION M1307
APPLIANCE INSTALLATION

M1307.1 General. Installation of *appliances* shall conform to the conditions of their *listing* and *label* and the manufacturer's instructions. The manufacturer's operating and installation instructions shall remain attached to the *appliance*.

[W] M1307.2 Anchorage of appliances. *Appliances* designed to be fixed in position shall be fastened or anchored in an *approved* manner. ((~~In Seismic Design Categories D_0, D_1 and D_2, and in townhouses in Seismic Design Category C, water heaters and thermal~~)) Thermal storage units shall be anchored or strapped to resist horizontal displacement caused by earthquake motion in accordance with one of the following:

1. Anchorage and strapping shall be designed to resist a horizontal force equal to one-third of the operating weight of the water ((~~heater~~)) storage tank, acting in any horizontal direction. ((~~Strapping shall be at points within the upper one-third and lower one-third of the *appliance's* vertical dimensions. At the lower point, the strapping shall maintain a minimum distance of 4 inches (102 mm) above the controls.~~))
2. The anchorage strapping shall be in accordance with the appliance manufacturer's recommendations.

Seismic anchorage and strapping of water heaters shall be in accordance with Section 507.2 of the *Uniform Plumbing Code.*

M1307.3 Elevation of ignition source. *Appliances* having an *ignition source* shall be elevated such that the source of ignition is not less than 18 inches (457 mm) above the floor in garages. For the purpose of this section, rooms or spaces that are not part of the *living space* of a *dwelling unit* and that communicate with a private garage through openings shall be considered to be part of the garage.

Exception: Elevation of the ignition source is not required for appliances that are listed as flammable-vapor-ignition resistant.

M1307.3.1 Protection from impact. *Appliances* shall not be installed in a location subject to vehicle damage except where protected by *approved* barriers.

M1307.4 Hydrogen generating and refueling operations. *Ventilation* shall be required in accordance with Section M1307.4.1, M1307.4.2 or M1307.4.3 in private garages that contain hydrogen-generating *appliances* or refueling systems. For the purpose of this section, rooms or spaces that are not part of the *living space* of a *dwelling unit* and that communicate directly with a private garage through openings shall be considered to be part of the private garage.

M1307.4.1 Natural ventilation. Indoor locations intended for hydrogen-generating or refueling operations shall be limited to a maximum floor area of 850 square feet (79 m^2) and shall communicate with the outdoors in accordance with Sections M1307.4.1.1 and M1307.4.1.2. The maximum rated output capacity of hydrogen-generating *appliances* shall not exceed 4 standard cubic feet per minute (1.9 L/s) of hydrogen for each 250 square feet (23 m^2) of floor area in such spaces. The minimum cross-sectional dimension of air openings shall be 3 inches (76 mm). Where ducts are used, they shall be of the same cross-sectional area as the free area of the openings to which they connect. In those locations, *equipment* and *appliances* having an *ignition source* shall be located so that the source of ignition is not within 12 inches (305 mm) of the ceiling.

M1307.4.1.1 Two openings. Two permanent openings shall be constructed within the garage. The upper opening shall be located entirely within 12 inches (305 mm) of the ceiling of the garage. The lower opening shall be located entirely within 12 inches (305 mm) of the floor of the garage. Both openings shall be constructed in the same exterior wall. The openings shall communicate directly with the outdoors and shall have a minimum free area of 1/2 square foot per 1,000 cubic feet (1.7 m^2/1000 m^3) of garage volume.

M1307.4.1.2 Louvers and grilles. In calculating free area required by Section M1307.4.1, the required size of openings shall be based on the net free area of each opening. If the free area through a design of louver or grille is known, it shall be used in calculating the size opening required to provide the free area specified. If the design and free area are not known, it shall be assumed that wood louvers will have a 25-percent free area and metal louvers and grilles will have a 75-percent free area. Louvers and grilles shall be fixed in the open position.

M1307.4.2 Mechanical ventilation. Indoor locations intended for hydrogen-generating or refueling operations shall be ventilated in accordance with Section 502.16 of the *International Mechanical Code*. In these locations, *equipment* and *appliances* having an *ignition source* shall be located so that the source of ignition is below the mechanical *ventilation* outlet(s).

M1307.4.3 Specially engineered installations. As an alternative to the provisions of Sections M1307.4.1 and M1307.4.2, the necessary supply of air for *ventilation* and dilution of flammable gases shall be provided by an *approved* engineered system.

M1307.5 Electrical appliances. Electrical *appliances* shall be installed in accordance with Chapters 14, 15, 19, 20 and 34 through 43.

M1411.3.2 Drain pipe materials and sizes. Components of the condensate disposal system shall be ABS, cast iron, copper, cross-linked polyethylene, CPVC, galvanized steel, PE-RT, polyethylene, polypropylene or PVC pipe or tubing. Components shall be selected for the pressure and temperature rating of the installation. Joints and connections shall be made in accordance with the applicable provisions of Chapter 30. Condensate waste and drain line size shall be not less than 3/4-inch (19 mm) nominal diameter from the drain pan connection to the place of condensate disposal. Where the drain pipes from more than one unit are manifolded together for condensate drainage, the pipe or tubing shall be sized in accordance with an *approved* method.

M1411.3.3 Drain line maintenance. Condensate drain lines shall be configured to permit the clearing of blockages and performance of maintenance without requiring the drain line to be cut.

M1411.3.4 Appliances, equipment and insulation in pans. Where *appliances, equipment* or insulation are subject to water damage when auxiliary drain pans fill, those portions of the *appliances, equipment* and insulation shall be installed above the flood level rim of the pan. Supports located inside of the pan to support the *appliance* or *equipment* shall be water resistant and *approved*.

M1411.4 Condensate pumps. Condensate pumps located in uninhabitable spaces, such as attics and crawl spaces, shall be connected to the appliance or equipment served such that when the pump fails, the appliance or equipment will be prevented from operating. Pumps shall be installed in accordance with the manufacturer's instructions.

M1411.5 Auxiliary drain pan. Category IV condensing *appliances* shall have an auxiliary drain pan where damage to any building component will occur as a result of stoppage in the condensate drainage system. These pans shall be installed in accordance with the applicable provisions of Section M1411.3.

Exception: Fuel-fired *appliances* that automatically shut down operation in the event of a stoppage in the condensate drainage system.

M1411.6 Insulation of refrigerant piping. Piping and fittings for refrigerant vapor (suction) lines shall be insulated with insulation having a thermal resistivity of not less than R-4 and having external surface permeance not exceeding 0.05 perm [2.87 ng/(s · m^2 · Pa)] when tested in accordance with ASTM E96.

M1411.7 Location and protection of refrigerant piping. Refrigerant piping installed within 1-1/2 inches (38 mm) of the underside of roof decks shall be protected from damage caused by nails and other fasteners.

M1411.8 Locking access port caps. Refrigerant circuit access ports located outdoors shall be fitted with locking-type tamper-resistant caps or shall be otherwise secured to prevent unauthorized access.

SECTION M1412
ABSORPTION COOLING EQUIPMENT

M1412.1 Approval of equipment. Absorption systems shall be installed in accordance with the manufacturer's instructions. Absorption equipment shall comply with UL 1995 or UL/CSA/ANCE 60335-2-40.

M1412.2 Condensate disposal. Condensate from the cooling coil shall be disposed of as provided in Section M1411.3.

M1412.3 Insulation of piping. Refrigerant piping, brine piping and fittings within a building shall be insulated to prevent condensation from forming on piping.

M1412.4 Pressure-relief protection. Absorption systems shall be protected by a pressure-relief device. Discharge from the pressure-relief device shall be located where it will not create a hazard to persons or property.

SECTION M1413
EVAPORATIVE COOLING EQUIPMENT

[W][S] M1413.1 General. Evaporative cooling equipment and appliances shall comply with UL 1995 or UL/CSA/ANCE 60335-2-40 and shall be installed:

1. In accordance with the manufacturer's instructions.
2. On level platforms in accordance with Section M1305.1.3.1.
3. So that openings in exterior walls are flashed in accordance with Section R703.4.
4. So as to protect the potable water supply in accordance with Section ((~~P2902~~)) 603 of the *Uniform Plumbing Code*.
5. So that air intake opening locations are in accordance with Section R303.5.1.

M1502.4.5.1 Specified length. The maximum length of the exhaust duct shall be 35 feet (10 668 mm) from the connection to the transition duct from the dryer to the outlet terminal. Where fittings are used, the maximum length of the exhaust duct shall be reduced in accordance with Table M1502.4.5.1. The maximum length of the exhaust duct does not include the transition duct.

TABLE M1502.4.5.1
DRYER EXHAUST DUCT FITTING EQUIVALENT LENGTH

DRYER EXHAUST DUCT FITTING TYPE	EQUIVALENT LENGTH
4-inch radius mitered 45-degree elbow	2 feet 6 inches
4-inch radius mitered 90-degree elbow	5 feet
6-inch radius smooth 45-degree elbow	1 foot
6-inch radius smooth 90-degree elbow	1 foot 9 inches
8-inch radius smooth 45-degree elbow	1 foot
8-inch radius smooth 90-degree elbow	1 foot 7 inches
10-inch radius smooth 45-degree elbow	9 inches
10-inch radius smooth 90-degree elbow	1 foot 6 inches

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.0175 rad.

M1502.4.5.2 Manufacturer's instructions. The size and maximum length of the exhaust duct shall be determined by the dryer manufacturer's installation instructions. The code official shall be provided with a copy of the installation instructions for the make and model of the dryer at the concealment inspection. In the absence of fitting equivalent length calculations from the clothes dryer manufacturer, Table M1502.4.5.1 shall be used.

M1502.4.5.3 Dryer exhaust duct power ventilator. The maximum length of the exhaust duct shall be determined in accordance with the manufacturer's instructions for the dryer exhaust duct power ventilator.

M1502.4.6 Length identification. Where the exhaust duct equivalent length exceeds 35 feet (10 668 mm), the equivalent length of the exhaust duct shall be identified on a permanent label or tag. The label or tag shall be located within 6 feet (1829 mm) of the exhaust duct connection.

M1502.4.7 Exhaust duct required. Where space for a clothes dryer is provided, an exhaust *duct system* shall be installed. Where the clothes dryer is not installed at the time of occupancy the exhaust duct shall be capped or plugged in the space in which it originates and identified and marked "future use."

Exception: Where a *listed* condensing clothes dryer is installed prior to occupancy of the structure.

M1502.5 Protection required. Protective shield plates shall be placed where nails or screws from finish or other work are likely to penetrate the clothes dryer exhaust duct. Shield plates shall be placed on the finished face of framing members where there is less than 1-1/4 inches (32 mm) between the duct and the finished face of the framing member. Protective shield plates shall be constructed of steel, shall have a minimum thickness of 0.062 inch (1.6 mm) and shall extend not less than 2 inches (51 mm) above sole plates and below top plates.

SECTION M1503
DOMESTIC COOKING EXHAUST EQUIPMENT

M1503.1 General. Domestic cooking exhaust equipment shall comply with the requirements of this section.

M1503.2 Domestic cooking exhaust. Where domestic cooking exhaust equipment is provided, it shall comply with one of the following:

1. The fan for overhead range hoods and downdraft exhaust equipment not integral with the cooking appliance shall be listed and labeled in accordance with UL 507.
2. Overhead range hoods and downdraft exhaust equipment with integral fans shall comply with UL 507.
3. Domestic cooking appliances with integral downdraft exhaust equipment shall be listed and labeled in accordance with ANSI Z21.1 or UL 858.
4. Microwave ovens with integral exhaust for installation over the cooking surface shall be listed and labeled in accordance with UL 923.

M1503.2.1 Open-top broiler exhaust. Domestic open-top broiler units shall be provided with a metal exhaust hood having a thickness of not less than 0.0157 inch (0.3950 mm) (No. 28 gage). Such hoods shall be installed with a clearance of not less than 1/4 inch (6.4 mm) between the hood and the underside of combustible material and cabinets. A clearance of not less than

24 inches (610 mm) shall be maintained between the cooking surface and combustible material and cabinets. The hood width shall be not less than the width of the broiler unit and shall extend over the entire unit.

Exception: Broiler units that incorporate an integral exhaust system, and that are listed and labeled for use without an exhaust hood, or broiler units permanently installed outside the building envelope and having the cooking surface at least 5'0" below a 1-hour fire resistance rated ceiling, shall not be required to have an exhaust hood.

M1503.3 Exhaust discharge. Domestic cooking exhaust equipment shall discharge to the outdoors through a duct. The duct shall have a smooth interior surface, shall be airtight, shall be equipped with a backdraft damper and shall be independent of all other exhaust systems. Ducts serving domestic cooking exhaust equipment shall not terminate in an attic or crawl space or areas inside the building.

Exception: Where installed in accordance with the manufacturer's instructions, and where mechanical ((~~or natural~~)) *ventilation* is otherwise provided, *listed* and *labeled* ductless range hoods shall not be required to discharge to the outdoors.

M1503.4 Duct material. Ducts serving domestic cooking exhaust equipment shall be constructed of galvanized steel, stainless steel or copper.

Exception: Ducts for domestic kitchen cooking *appliances* equipped with down-draft exhaust systems shall be permitted to be constructed of schedule 40 PVC pipe and fittings provided that the installation complies with all of the following:

1. The duct is installed under a concrete slab poured on grade.
2. The underfloor trench in which the duct is installed is completely backfilled with sand or gravel.
3. The PVC duct extends not more than 1 inch (25 mm) above the indoor concrete floor surface.
4. The PVC duct extends not more than 1 inch (25 mm) above grade *outside of the building.*
5. The PVC ducts are solvent cemented.

M1503.5 Kitchen exhaust rates. Where domestic kitchen cooking *appliances* are equipped with ducted range hoods or down-draft exhaust systems, the fans shall be sized in accordance with Section M1505.5.

M1503.6 Makeup air required. Where one or more gas, liquid or solid fuel-burning appliance that is neither direct-vent nor uses a mechanical draft venting system is located within a dwelling unit's air barrier, each exhaust system capable of exhausting in excess of 400 cubic feet per minute (0.19 m^3/s) shall be mechanically or passively provided with makeup air at a rate approximately equal to the exhaust air rate. Such makeup air systems shall be equipped with not fewer than one damper complying with Section M1503.6.2.

Exception: Makeup air is not required for exhaust systems installed for the exclusive purpose of space cooling and intended to be operated only when windows or other air inlets are open.

M1503.6.1 Location. Kitchen exhaust makeup air shall be discharged into the same room in which the exhaust system is located or into rooms or *duct systems* that communicate through one or more permanent openings with the room in which such exhaust system is located. Such permanent openings shall have a net cross-sectional area not less than the required area of the makeup air supply openings.

M1503.6.2 Makeup air dampers. Where makeup air is required by Section M1503.6, makeup air dampers shall comply with this section. Each damper shall be a gravity damper or an electrically operated damper that automatically opens when the exhaust system operates. Dampers shall be located to allow access for inspection, service, repair and replacement without removing permanent construction or any other ducts not connected to the damper being inspected, serviced, repaired or replaced. Gravity or barometric dampers shall not be used in passive makeup air systems except where the dampers are rated to provide the design makeup airflow at a pressure differential of 0.01 in. w.c. (3 Pa) or less.

SECTION M1504
EXHAUST DUCTS AND EXHAUST OPENINGS

M1504.1 Duct construction. Where exhaust duct construction is not specified in this chapter, construction shall comply with Chapter 16.

M1504.2 Duct length. The length of exhaust and supply ducts used with ventilating equipment shall not exceed the lengths determined in accordance with Table M1504.2.

Exception: Duct length shall not be limited where the duct system complies with the manufacturer's design criteria or where the flow rate of the installed ventilating equipment is verified by the installer or approved third party using a flow hood, flow grid or other airflow measuring device.

TABLE M1504.2
DUCT LENGTH

DUCT TYPE	FLEX DUCT								SMOOTH-WALL DUCT							
Fan airflow rating (CFM @ 0.25 inch wc[a])	50	80	100	125	150	200	250	300	50	80	100	125	150	200	250	300
Diameter[b] (inches)	Maximum length[c, d, e] (feet)															
3	X	X	X	X	X	X	X	X	5	X	X	X	X	X	X	X
4	56	4	X	X	X	X	X	X	114	31	10	X	X	X	X	X
5	NL	81	42	16	2	X	X	X	NL	152	91	51	28	4	X	X
6	NL	NL	158	91	55	18	1	X	NL	NL	NL	168	112	53	25	9
7	NL	NL	NL	NL	161	78	40	19	NL	NL	NL	NL	NL	148	88	54
8 and above	NL	NL	NL	NL	NL	189	111	69	NL	NL	NL	NL	NL	NL	198	133

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Fan airflow rating shall be in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51.

b. For noncircular ducts, calculate the diameter as four times the cross-sectional area divided by the perimeter.

c. This table assumes that elbows are not used. Fifteen feet of allowable duct length shall be deducted for each elbow installed in the duct run.

d. NL = no limit on duct length of this size.

e. X = not allowed. Any length of duct of this size with assumed turns and fittings will exceed the rated pressure drop.

[W] M1504.3 Exhaust openings. Air exhaust openings shall terminate as follows:

1. Not less than 3 feet (914 mm) from property lines.
2. Not less than 3 feet (914 mm) from gravity air intake openings, operable windows and doors.
3. Not less than 10 feet (3048 mm) from mechanical air intake openings except where either of the following apply:
   3.1 ((~~the~~)) The exhaust opening is located not less than 3 feet (914 mm) above the air intake opening.
   3.2 The exhaust opening is part of a factory-built intake/exhaust combination termination fitting installed in accordance with the manufacturer's instructions, and the exhaust air is drawn from a living space.
4. Openings shall comply with Sections R303.5.2 and R303.6.

SECTION M1505
MECHANICAL VENTILATION

M1505.1 General. Where local exhaust or whole-house mechanical ventilation is provided, the *equipment* shall be designed in accordance with this section.

M1505.2 Recirculation of air. Exhaust air from bathrooms and toilet rooms shall not be recirculated within a residence or circulated to another *dwelling unit* and shall be exhausted directly to the outdoors. Exhaust air from bathrooms, toilet rooms and kitchens shall not discharge into an *attic*, crawl space or other areas inside the building. This section shall not prohibit the installation of ductless range hoods in accordance with the exception to Section M1503.3.

M1505.3 Exhaust equipment. Exhaust equipment serving single *dwelling units* shall be *listed* and *labeled* as providing the minimum required airflow in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51.

[W] M1505.4 Whole-house mechanical ventilation system. Each dwelling unit shall be equipped with a ventilation system. ((~~Whole~~)) The whole-house mechanical ventilation systems shall be designed in accordance with Sections M1505.4.1 through M1505.4.4.

[W] M1505.4.1 System design. The whole-house ventilation system shall consist of one or more supply fans, one or more exhaust fans, or ((~~a combination of such~~)) an ERV/HRV with integral fans, and associated ducts and controls. Whole-house mechanical ventilation system with supply and exhaust fans per Sections M1505.4.1.2, M1505.4.1.3, M1505.4.1.4, and M1505.4.1.5. Local exhaust or supply fans are permitted to serve as ((~~such a~~)) part of the whole house ventilation system when provided with the proper controls per Section M1505.4.2. ((~~Outdoor air ducts connected to the return side of an air handler shall be considered as providing supply ventilation.~~)) The systems shall be designed and installed to exhaust and/or supply the minimum outdoor airflow rates per Section M1505.4.3 as modified by whole house ventilation system coefficients in Section M1505.4.3.1 where applicable. The whole house ventilation system shall operate continuously at the minimum ventilation rate determined per Section M1505.4.2 unless configured with intermittent off controls per Section M1505.4.3.2.

M1505.4.1.1 Whole house system component requirements. Whole house ventilation supply and exhaust fans specified in this section shall have a minimum efficacy as prescribed in the Washington State Energy Code. Design and installation of the system or equipment shall be carried out in accordance with manufacturers' installation instructions. Whole house

ventilation fans shall be rated for sound at no less than the minimum airflow rate required by Section M1505.4.3.1. Ventilation fans shall be rated for sound at a maximum of 1.0 sone. This sound rating shall be at a minimum of 0.1 in. w.c. (25 Pa) static pressure in accordance with HVI procedures specified in Sections M1505.4.1.2 and M1505.4.1.3.

Exception: HVAC air handlers, ERV/HRV units, and remote mounted fans need not meet the sound requirements. To be considered for this exception, a remote mounted fan must be mounted outside the habitable spaces, bathrooms, toilets, and hallways, and there must be at least 4 ft (1 m) of ductwork between the fan and the intake grille.

The whole house supply fan shall provide ducted outdoor ventilation air to each habitable space within the residential unit.

Exception: Interior joining spaces provided with a 30 cfm whole house transfer fan or a permanent opening with an area of not less than 8 percent of the floor area of the interior adjoining space but not less than 25 square feet do not require ducted outdoor ventilation air to be supplied directly to the space. Whole house transfer fans shall meet the sone rating of Section M1505.4.1.1 and shall have whole house ventilation controls that comply with Section M1505.4.2.

M1505.4.1.2 Exhaust fans. Exhaust fans required shall be ducted directly to the outside. Exhaust air outlets shall be designed to limit the pressure difference to the outside and equipped with backdraft dampers or motorized dampers in accordance with the Washington State Energy Code. Exhaust fans shall be tested and rated in accordance with the airflow and sound rating procedures of the Home Ventilating Institute (HVI 915, HVI Loudness Testing and Rating Procedure, HVI 916, HVI Airflow Test Procedure, and HVI 920, HVI Product Performance Certification Procedure, as applicable). Exhaust fans required in this section may be used to provide local ventilation. Bathroom exhaust fans that are designed for intermittent exhaust airflow rates higher than the continuous exhaust airflow rates in Table M1505.4.3(3) shall be provided with occupancy sensors or humidity sensors to automatically override the fan to the high speed airflow rate. The exhaust fans shall be tested and the testing results shall be submitted and posted in accordance with Section M1505.4.1.6.

M1505.4.1.3 Supply fans. Supply fans used in meeting the requirements of this section shall supply outdoor air from intake openings in accordance with IMC Sections 401.4 and 401.5. When designed for intermittent off operation, supply systems shall be equipped with motorized dampers in accordance with the Washington State Energy Code. Supply fans shall be tested and rated in accordance with the airflow and sound rating procedures of the Home Ventilating Institute (HVI 915, HVI Loudness Testing and Rating Procedure, HVI 916, HVI Airflow Test Procedure, and HVI 920, HVI Product Performance Certification Procedure, as applicable). Where outdoor air is provided by supply fan systems the outdoor air shall be filtered. The filter shall be accessible for regular maintenance and replacement. The filter shall have a Minimum Efficiency Rating Value (MERV) of at least 8.

M1505.4.1.4 Balanced whole house ventilation system. A balanced whole house ventilation system shall include both supply and exhaust fans. The supply and exhaust fans shall have airflow that is within 10 percent of each other. The tested and balanced total mechanical exhaust airflow rate is within 10 percent or 5 cfm, whichever is greater, of the total mechanical supply airflow rate. The flow rate test results shall be submitted and posted in accordance with Section M1505.4.1.7. The exhaust fan shall meet the requirements of Section M1505.4.1.2. The supply fan shall meet the requirements of Section M1505.4.1.3. Balanced ventilation systems with both supply and exhaust fans in a packaged product, such as an ERV/HRV shall meet the requirements of HVI 920, as applicable. Intermittent dryer exhaust, intermittent range hood exhaust, and intermittent toilet room exhaust airflow rates above the residential dwelling or sleeping unit minimum ventilation rate are exempt from the balanced airflow calculation.

M1505.4.1.5 Furnace integrated supply. Systems using space heating and/or cooling air handler fans for outdoor air supply distribution are not permitted.

Exception: Air handler fans shall have multispeed or variable speed supply airflow control capability with a low speed operation not greater than 25 percent of the rated supply airflow capacity during ventilation only operation. Outdoor air intake openings must meet the provisions of Sections R303.5 and R303.6 and must include a motorized damper that is activated by the whole house ventilation system controller. The motorized damper must be controlled to maintain the outdoor airflow intake airflow within 10 percent of the whole house mechanical exhaust airflow rate. The flow rate for the outdoor air intake must be tested and verified at the minimum ventilation fan speed and the maximum heating or cooling fan speed. The results of the test shall be submitted and posted in accordance with Section M1505.4.1.7.

M1505.4.1.6 Testing. Whole-house mechanical ventilation systems shall be tested, balanced and verified to provide a flow rate not less than the minimum required by Sections M1505.4.3 and M1505.4.4. Testing shall be performed according to the ventilation equipment manufacturer's instructions, or by using a flow hood, flow grid, or other airflow measuring device at the mechanical ventilation fan's inlet terminals, outlet terminals or grilles or in the connected ventilation ducts. Where required by the building official, testing shall be conducted by an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the building official and be posted in the dwelling unit per Section M1505.4.1.7.

M1505.4.1.7 Certificate. A permanent certificate shall be completed by the mechanical contractor, test and balance contractor or other approved party and posted on a wall in the space where the furnace is located, a utility room, or an approved location inside the building. When located on an electrical panel, the certificate shall not cover or obstruct the

visibility of the circuit directory label, service disconnect label, or other required labels. The certificate shall list the flow rate determined from the delivered airflow of the whole-house mechanical ventilation system as installed and the type of mechanical whole house ventilation system used to comply with Section M1505.4.3.1.

[W] M1505.4.2 System controls. The whole-house mechanical ventilation system shall be provided with controls that ((~~enable manual override.~~)) comply with the following:

1. The whole house ventilation system shall be controlled with manual switches, timers or other means that provide for automatic operation of the ventilation system that are readily accessible by the occupant;
2. Whole-house mechanical ventilation system shall be provided with controls that enable manual override off of the system by the occupant during periods of poor outdoor air quality. Controls shall include permanent text or a symbol indicating their function. Recommended control permanent labeling to include text similar to the following: "Leave on unless outdoor air quality is very poor." Manual controls shall be readily accessible by the occupant;
3. Whole house ventilation systems shall be configured to operate continuously except where intermittent off controls and sizing are provided per Section M1505.4.3.2.

[W] M1505.4.3 Mechanical ventilation rate. The whole- house mechanical ventilation system shall provide outdoor air at a continuous rate as determined in accordance with Table M1505.4.3(1) or Equation 15-1.

Ventilation rate in cubic feet per minute = (0.01 × total square foot area of house) + [7.5 × (number of bedrooms + 1)] but not less than 30 cfm for each dwelling unit. (**Equation 15-1)**

((~~**Exception:** The whole-house mechanical ventilation system is permitted to operate intermittently where the system has controls that enable operation for not less than 25 percent of each 4-hour segment and the ventilation rate prescribed in Table M1505.4.3(1) is multiplied by the factor determined in accordance with Table M1505.4.3(2).~~))

((~~**TABLE M1505.4.3(1)**~~
~~**CONTINUOUS WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM AIRFLOW RATE REQUIREMENTS**~~

~~DWELLING UNIT FLOOR AREA (square feet)~~	~~NUMBER OF BEDROOMS~~				
	~~0 – 1~~	~~2 – 3~~	~~4 – 5~~	~~6 – 7~~	~~> 7~~
	~~Airflow in CFM~~				
~~< 1,500~~	~~30~~	~~45~~	~~60~~	~~75~~	~~90~~
~~1,501 – 3,000~~	~~45~~	~~60~~	~~75~~	~~90~~	~~105~~
~~3,001 – 4,500~~	~~60~~	~~75~~	~~90~~	~~105~~	~~120~~
~~4,501 – 6,000~~	~~75~~	~~90~~	~~105~~	~~120~~	~~135~~
~~6,001 – 7,500~~	~~90~~	~~105~~	~~120~~	~~135~~	~~150~~
~~> 7,500~~	~~105~~	~~120~~	~~135~~	~~150~~	~~165~~

~~For SI: 1 square foot = 0.0929 m²; 1 cubic foot per minute = 0.0004719 m³/s.~~))

TABLE M1505.4.3(1)
WHOLE-HOUSE MECHANICAL VENTILATION AIRFLOW RATE

DWELLING UNIT FLOOR AREA (SQUARE FEET)	NUMBER OF BEDROOMS				
	0 - 1	2	3	4	5 OR MORE
	AIRFLOW IN CFM				
< 500	30	30	35	45	50
501 – 1,000	30	35	40	50	55
1,001 – 1,500	30	40	45	55	60
1,501 – 2,000	35	45	50	60	65
2,001 – 2,500	40	50	55	65	70
2,501 – 3,000	45	55	60	70	75
3,001 – 3,500	50	60	65	75	80
3,501 – 4,000	55	65	70	80	85
4,001 – 4,500	60	70	75	85	90
4,501 – 5,000	65	75	80	90	95

M1505.4.3.1 Ventilation quality adjustment. The minimum whole house ventilation rate from Section 1505.4.3 shall be adjusted by the system coefficient in Table M1505.4.3(2) based on the system type not meeting the definition of a balanced whole house ventilation system and/or not meeting the definition of a distributed whole house ventilation system.

$Q_v = Q_r \times C_{system}$ **(Equation 15-2)**

Where:

Q_v = Quality-adjusted ventilation airflow rate in cubic feet per minute (cfm).

Q_r = Ventilation airflow rate, cubic feet per minute (cfm) from 15-1 or Table M1505.4.3(1).

C_{system} = System coefficient from Table 1505.4.3(2).

TABLE M1505.4.3(2)
SYSTEM COEFFICIENT (C_{system})

SYSTEM TYPE	DISTRIBUTED	NOT DISTRIBUTED
Balanced	1.0	1.25
Not balanced	1.25	1.5

M1505.4.3.2 Intermittent off operation. Whole-house mechanical ventilation systems shall be provided with advanced controls that are configured to operate the system with intermittent off operation shall operate for a least two hours in each four-hour segment. The whole house ventilation airflow rate determined in accordance with Section M1505.4.3 as corrected by Section M1505.4.3.1 is multiplied by the factor determined in accordance with Table M1505.4.3(3).

TABLE ((~~M1505.4.3(2)~~)) M1505.4.3(3)
INTERMITTENT OFF WHOLE-HOUSE MECHANICAL VENTILATION RATE FACTORS[a,b]

RUN-TIME % IN EACH 4-HOUR SEGMENT	((~~25%~~))	((~~33%~~))	50%	66%	75%	100%
FACTOR[a]	((~~4~~))	((~~3~~))	2	1.5	1.3	1.0

a. For ventilation system run time values between those given, the factors are permitted to be determined by interpolation.
b. Extrapolation beyond the table is prohibited.

[W] M1505.4.4 Local exhaust rates. *Local exhaust systems* shall be designed to have the capacity to exhaust the minimum airflow rate determined in accordance with Table M1505.4.4. If the local exhaust fan is included in the whole house ventilation system, in accordance with Section 1505.4.1, then the exhaust fan shall be controlled to operate as specified in Section M1505.4.2.

M1505.4.4.1 Local exhaust. Bathrooms, toilet rooms, and kitchens shall include a local exhaust system. Such local exhaust systems shall have the capacity to exhaust the minimum airflow rate in accordance with Table M1505.4.4(1). Fans required by this section shall be provided with controls that enable manual override or automatic occupancy sensor, humidity sensor or pollutant sensor controls. An "on/off" switch shall meet this requirement for manual controls. Manual fan controls shall be readily accessible in the room served by the fan.

TABLE M1505.4.4(1)
MINIMUM ((~~REQUIRED~~)) LOCAL EXHAUST RATES ((~~FOR ONE- AND TWO-FAMILY DWELLINGS~~))

AREA TO BE EXHAUSTED	EXHAUST RATES	
	INTERMITTENT	CONTINUOUS
Kitchens	100 cfm ((~~intermittent or 25 cfm continuous~~))	30 cfm
Bathrooms – Toilet rooms	((~~Mechanical exhaust capacity of~~)) 50 cfm ((~~intermittent or 20 cfm continuous[e]~~))	20 cfm

For SI: 1 cubic foot per minute = 0.0004719 m^3/s.

M1505.4.4.2 Local exhaust fans. Exhaust fans shall meet the following criteria:

1. Exhaust fans shall be tested and rated in accordance with the airflow and sound rating procedures of the Home Ventilating Institute (HVI 915, HVI Loudness Testing and Rating Procedure, HVI 916, HVI Airflow Test Procedure, and HVI 920, HVI Product Performance Certification Procedure).

   Exception: Where a range hood or down draft exhaust fan is used for local exhaust for a kitchen, the device is not required to be rated per these standards.
2. Fan airflow rating and duct system shall be designed and installed to deliver at least the exhaust airflow required by Table M1505.4.4(1). The airflows required refer to the delivered airflow of the system as installed and tested using a flow hood, flow grid, or other airflow measurement device. Local exhaust systems shall be tested, balanced, and verified to provide a flow rate not less than the minimum required by this section.
3. Design and installation of the system or equipment shall be carried out in accordance with manufacturers' installation instructions.

4. Fan airflow rating and duct system shall be designed and installed to deliver at least the exhaust airflow required by Table M1505.4.4(1).

Exceptions:

1. An exhaust airflow rating at a pressure of 0.25 in. w.g. may be used, provided the duct sizing meets the prescriptive requirements of Table M1505.4.4(2).
2. Where a range hood or down draft exhaust fan is used to satisfy the local ventilation requirements for kitchens, the range hood or down draft exhaust shall not be less than 100 cfm at 0.10 in. w.g.

TABLE M1505.4.4(2)
PRESCRIPTIVE EXHAUST DUCT SIZING

FAN TESTED CFM AT 0.25 INCHES W.G.	MINIMUM FLEX DIAMETER	MAXIMUM LENGTH IN FEET	MINIMUM SMOOTH DIAMETER	MAXIMUM LENGTH IN FEET	MAXIMUM ELBOWS[a]
50	4 inches	25	4 inches	70	3
50	5 inches	90	5 inches	100	3
50	6 inches	No Limit	6 inches	No Limit	3
80	4 inches[b]	NA	4 inches	20	3
80	5 inches	15	5 inches	100	3
80	6 inches	90	6 inches	No Limit	3
100	5 inches[b]	NA	5 inches	50	3
100	6 inches	45	6 inches	No Limit	3
125	6 inches	15	6 inches	No Limit	3
125	7 inches	70	7 inches	No Limit	3

a. For each additional elbow, subtract 10 feet from length.

b. Flex ducts of this diameter are not permitted with fans of this size.

CHAPTER 16

DUCT SYSTEMS

User notes:

About this chapter: *Chapter 16 addresses duct construction for HVAC and most exhaust systems. This chapter covers duct materials, duct construction, duct installation, duct insulation properties, duct sealing, above-ground and underground ducts, return air intake locations and air plenums.*

Code development reminder: *Code change proposals to this chapter will be considered by the IRC—Plumbing/Mechanical Code Development Committee during the 2018 (Group A) Code Development Cycle. See explanation on page iv.*

SECTION M1601
DUCT CONSTRUCTION

M1601.1 Duct design. *Duct systems* serving heating, cooling and *ventilation equipment* shall be installed in accordance with the provisions of this section and ACCA Manual D, the appliance manufacturer's installation instructions or other *approved* methods.

[W] M1601.1.1 Above-ground duct systems. Above-ground *duct systems* shall conform to the following:

1. *Equipment* connected to *duct systems* shall be designed to limit discharge air temperature to not greater than 250°F (121°C).
2. Factory-made ducts shall be listed and labeled in accordance with UL 181 and installed in accordance with the manufacturer's instructions.
3. Fibrous glass duct construction shall conform to the SMACNA *Fibrous Glass Duct Construction Standards* or NAIMA *Fibrous Glass Duct Construction Standards.*
4. Field-fabricated and shop-fabricated metal and flexible duct constructions shall conform to the SMACNA HVAC *Duct Construction Standards—Metal and Flexible* except as allowed by Table M1601.1.1. Galvanized steel shall conform to ASTM A653.
5. The use of gypsum products to construct return air ducts or plenums is permitted, provided that the air temperature does not exceed 125°F (52°C) and exposed surfaces are not subject to condensation.
6. *Duct systems* shall be constructed of materials having a flame spread index of not greater than 200.
7. Stud wall cavities and the spaces between solid floor joists <u>shall not be used as a duct or an air plenum in new construction. For existing systems, stud wall cavities and the spaces between solid floor joists</u> to be used as air plenums shall comply with the following conditions:
   - 7.1. These cavities or spaces shall not be used as a plenum for supply air.
   - 7.2. These cavities or spaces shall not be part of a required fire-resistance-rated assembly.
   - 7.3. Stud wall cavities shall not convey air from more than one floor level.
   - 7.4. Stud wall cavities and joist-space plenums shall be isolated from adjacent concealed spaces by tight-fitting fireblocking in accordance with Section R602.8.
   - 7.5. Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air plenums.
8. Volume dampers, equipment and other means of supply, return and exhaust air adjustment used in system balancing shall be provided with access.

M1601.1.2 Underground duct systems. Underground *duct systems* shall be constructed of *approved* concrete, clay, metal or plastic. The maximum design temperature for systems utilizing plastic duct and fittings shall be 150°F (66°C). Metal ducts shall be protected from corrosion in an *approved* manner or shall be completely encased in concrete not less than 2 inches (51 mm) thick. Nonmetallic ducts shall be installed in accordance with the manufacturer's instructions. Plastic pipe and fitting materials shall conform to cell classification 12454-B of ASTM D1248 or ASTM D1784 and external loading properties of ASTM D2412. Ducts shall slope to a drainage point that has access. Ducts shall be sealed, secured and tested prior to encasing the ducts in concrete or direct burial. Duct tightness shall be verified as required by Section N1103.3. Metallic ducts having an *approved* protective coating and nonmetallic ducts shall be installed in accordance with the manufacturer's instructions.

CHAPTER 17

COMBUSTION AIR

User notes:

About this chapter: *Chapter 17 applies only to oil-fired and solid fuel-fired appliances. Chapter 24 applies to combustion air for gas-fired appliances.*

Code development reminder: *Code change proposals to this chapter will be considered by the IRC—Plumbing/Mechanical Code Development Committee during the 2018 (Group A) Code Development Cycle. See explanation on page iv.*

SECTION M1701
GENERAL

[W] M1701.1 Scope. Solid fuel-burning *appliances* shall be provided with *combustion air* in accordance with the *appliance* manufacturer's installation instructions. Oil-fired *appliances* shall be provided with *combustion air* in accordance with NFPA 31. The methods of providing *combustion air* in this chapter do not apply to fireplaces, fireplace stoves and direct-vent *appliances*. The requirements for combustion and dilution air for gas-fired *appliances* shall be in accordance with Chapter 24.

Fireplaces shall comply with Chapter 10.

M1701.2 Opening location. In flood hazard areas as established in Table R301.2(1), *combustion air* openings shall be located at or above the elevation required in Section R322.2.1 or R322.3.2.

CHAPTER 20

BOILERS AND WATER HEATERS

User notes:

About this chapter: *Chapter 20 is specific to boilers and waters heaters. The provisions of this chapter apply to appliances generally without regard to the energy source. Gas-fired boilers and water heaters are also addressed in Chapter 24; therefore, Chapters 20 and 24 both apply to such appliances.*

Code development reminder: *Code change proposals to this chapter will be considered by the IRC—Plumbing/Mechanical Code Development Committee during the 2018 (Group A) Code Development Cycle. See explanation on page iv.*

SECTION M2001
BOILERS

((~~**M2001.1 Installation.** In addition to the requirements of this code, the installation of boilers shall conform to the manufacturer's instructions. The manufacturer's rating data, the nameplate and operating instructions of a permanent type shall be attached to the boiler. Boilers shall have their controls set, adjusted and tested by the installer. A complete control diagram together with complete boiler operating instructions shall be furnished by the installer. Solid and liquid fuel-burning boilers shall be provided with *combustion air* as required by Chapter 17.~~

~~**M2001.1.1 Standards.** Packaged oil-fired boilers shall be *listed* and *labeled* in accordance with UL 726. Packaged electric boilers shall be *listed* and *labeled* in accordance with UL 834. Solid fuel-fired boilers shall be *listed* and *labeled* in accordance with UL 2523. Boilers shall be designed, constructed and certified in accordance with the ASME *Boiler and Pressure Vessel Code*, Section I or IV. Controls and safety devices for boilers with fuel input ratings of 12,500,000 Btu/hr (3663 kW) or less shall meet the requirements of ASME CSD-1. Gas-fired boilers shall conform to the requirements listed in Chapter 24.~~))

M2001.1 Boilers. Boilers shall comply with the *Seattle Boiler and Pressure Vessel Code*.

((~~**M2001.2 Clearance.** Boilers shall be installed in accordance with their *listing* and *label*.~~

~~**M2001.3 Valves.** Every boiler or modular boiler shall have a shutoff valve in the supply and return piping. For multiple boiler or multiple modular boiler installations, each boiler or modular boiler shall have individual shutoff valves in the supply and return piping.~~

~~**Exception:** Shutoff valves are not required in a system having a single low-pressure steam boiler.~~

~~**M2001.4 Flood-resistant installation.** In flood hazard areas established in Table R301.2(1), boilers, water heaters and their control systems shall be located or installed in accordance with Section R322.1.6.~~

~~SECTION M2002~~
~~OPERATING AND SAFETY CONTROLS~~

~~**M2002.1 Safety controls.** Electrical and mechanical operating and safety controls for boilers shall be *listed* and *labeled*.~~

~~**M2002.2 Hot water boiler gauges.** Every hot water boiler shall have a pressure gauge and a temperature gauge, or combination pressure and temperature gauge. The gauges shall indicate the temperature and pressure within the normal range of the system's operation.~~

~~**M2002.3 Steam boiler gauges.** Every steam boiler shall have a water-gauge glass and a pressure gauge. The pressure gauge shall indicate the pressure within the normal range of the system's operation. The gauge glass shall be installed so that the mid-point is at the normal water level.~~

~~**M2002.4 Pressure relief valve.** Boilers shall be equipped with pressure relief valves with minimum rated capacities for the *equipment* served. Pressure relief valves shall be set at the maximum rating of the boiler. Discharge shall be piped to drains by gravity to within 18 inches (457 mm) of the floor or to an open receptor.~~

~~**M2002.5 Boiler low-water cutoff.** Steam and hot water boilers shall be protected with a low-water cutoff control.~~

~~**Exception:** A low-water cutoff is not required for coil-type and water-tube-type boilers that require forced circulation of water through the boiler and that are protected with a flow-sensing control.~~

~~**M2002.6 Operation.** Low-water cutoff controls and flow-sensing controls required by Section M2002.5 shall automatically stop the combustion operation of the appliance when the water level drops below the lowest safe water level as established by the manufacturer or when the water circulation flow is less than that required for safe operation of the appliance, respectively.~~

~~SECTION M2003~~
~~EXPANSION TANKS~~

~~**M2003.1 General.** Hot water boilers shall be provided with expansion tanks. Nonpressurized expansion tanks shall be securely fastened to the structure or boiler and supported to carry twice the weight of the tank filled with water. Provisions shall be made for draining nonpressurized tanks without emptying the system.~~

~~**M2003.1.1 Pressurized expansion tanks.** Pressurized expansion tanks shall be consistent with the volume and capacity of the system. Tanks shall be capable of withstanding a hydrostatic test pressure of two and one-half times the allowable working pressure of the system.~~

~~**M2003.2 Minimum capacity.** The minimum capacity of expansion tanks shall be determined from Table M2003.2.~~

~~**TABLE M2003.2**~~
~~**EXPANSION TANK MINIMUM CAPACITY[a] FOR FORCED HOT WATER SYSTEMS**~~

~~SYSTEM VOLUME[b] (gallons)~~	~~PRESSURIZED DIAPHRAGM TYPE~~	~~NONPRESSURIZED TYPE~~
~~10~~	~~1.0~~	~~1.5~~
~~20~~	~~1.5~~	~~3.0~~
~~30~~	~~2.5~~	~~4.5~~
~~40~~	~~3.0~~	~~6.0~~
~~50~~	~~4.0~~	~~7.5~~
~~60~~	~~5.0~~	~~9.0~~
~~70~~	~~6.0~~	~~10.5~~
~~80~~	~~6.5~~	~~12.0~~
~~90~~	~~7.5~~	~~13.5~~
~~100~~	~~8.0~~	~~15.0~~

~~For SI: 1 gallon = 3.785 L, 1 pound per square inch gauge = 6.895 kPa, °C = [(°F) 32]/1.8.~~

~~a. Based on average water temperature of 195°F, fill pressure of 12 psig and an operating pressure of not greater than 30 psig.~~

~~b. System volume includes volume of water in boiler, convectors and piping, not including the expansion tank.~~))

SECTION M2004
WATER HEATERS USED FOR SPACE HEATING

M2004.1 General. Water heaters used to supply both potable hot water and hot water for space heating shall be installed in accordance with this chapter, Chapter 24, Chapter 28 and the manufacturer's instructions.

SECTION M2005
WATER HEATERS

[W] M2005.1 General. Water heaters shall be installed in accordance with Chapter ((~~28~~)) 5 of the *Uniform Plumbing Code*, the manufacturer's instructions and the requirements of this code. Water heaters installed in an attic shall comply with the requirements of Section M1305.1.2. Gas-fired water heaters shall comply with the requirements in Chapter 24. Domestic electric water heaters shall comply with UL 174. Oiled-fired water heaters shall comply with UL 732. Solar thermal water heating systems shall comply with Chapter 23 and SRCC 300. Solid fuel-fired water heaters shall comply with UL 2523.

M2005.2 Prohibited locations. Fuel-fired water heaters shall not be installed in a room used as a storage closet. Water heaters located in a bedroom or bathroom shall be installed in a sealed enclosure so that *combustion air* will not be taken from the living space. Installation of direct-vent water heaters within an enclosure is not required.

M2005.2.1 Water heater access. Access to water heaters that are located in an *attic* or underfloor crawl space is permitted to be through a closet located in a sleeping room or bathroom where *ventilation* of those spaces is in accordance with this code.

M2005.3 Electric water heaters. Electric water heaters shall be installed in accordance with the applicable provisions of Chapters 34 through 43.

M2005.4 Supplemental water-heating devices. Potable water-heating devices that use refrigerant-to-water heat exchangers shall be *approved* and installed in accordance with the manufacturer's instructions.

M2101.2 System drain down. Hydronic piping systems shall be installed to permit draining of the system. Where the system drains to the plumbing drainage system, the installation shall conform to the requirements of Chapters 25 through 32 of this code.

Exception: The buried portions of systems embedded underground or under floors.

[S] M2101.3 Protection of potable water. The potable water system shall be protected from backflow in accordance with the provisions listed in Section ((~~P2902~~)) 603 of the *Uniform Plumbing Code*.

M2101.4 Pipe penetrations. Openings through concrete or masonry building elements shall be sleeved.

M2101.5 Contact with building material. A hydronic piping system shall not be in direct contact with any building material that causes the piping material to degrade or corrode.

M2101.6 Drilling and notching. Wood-framed structural members shall be drilled, notched or altered in accordance with the provisions of Sections R502.8, R602.6, R602.6.1 and R802.7. Holes in load-bearing members of cold-formed steel light-frame construction shall be permitted only in accordance with Sections R505.2.6, R603.2.6 and R804.2.6. In accordance with the provisions of Sections R505.3.5, R603.3.4 and R804.3.3, cutting and notching of flanges and lips of load-bearing members of cold-formed steel light-frame construction shall not be permitted. Structural insulated panels (SIPs) shall be drilled and notched or altered in accordance with the provisions of Section R610.7.

[W] ((~~M2101.7 Prohibited tee applications.~~ ~~Fluid in the supply side of a hydronic system shall not enter a tee fitting through the branch opening.~~))

M2101.8 Expansion, contraction and settlement. Piping shall be installed so that piping, connections and *equipment* shall not be subjected to excessive strains or stresses. Provisions shall be made to compensate for expansion, contraction, shrinkage and structural settlement.

M2101.9 Piping support. Hangers and supports shall be of material of sufficient strength to support the piping, and shall be fabricated from materials compatible with the piping material. Piping shall be supported at intervals not exceeding the spacing specified in Table M2101.9.

TABLE M2101.9
HANGER SPACING INTERVALS

PIPING MATERIAL	MAXIMUM HORIZONTAL SPACING (feet)	MAXIMUM VERTICAL SPACING (feet)
ABS	4	10[a]
CPVC ≤ 1-inch pipe or tubing	3	5[a]
CPVC ≥ 1-1/4 inches	4	10[a]
Copper or copper-alloy pipe	12	10
Copper or copper-alloy tubing	6	10
PB pipe or tubing	2.67	4
PE pipe or tubing	2.67	4
PE-RT ≤ 1 inch	2.67	10[a]
PE-RT ≥ 1-1/4 inches	4	10[a]
PEX tubing ≤ 1 inch	2.67	4
PEX tubing ≥ 1-1/4 inches	4	10[a]
PP < 1-inch pipe or tubing	2.67	4
PP > 1-1/4 inches	4	10[a]
PVC	4	10[a]
Steel pipe	12	15
Steel tubing	8	10

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. For sizes 2 inches and smaller, a guide shall be installed midway between required vertical supports. Such guides shall prevent pipe movement in a direction perpendicular to the axis of the pipe.

M2101.10 Tests. Hydronic piping systems shall be tested hydrostatically at a pressure of one and one-half times the maximum system design pressure, but not less than 100 pounds per square inch (689 kPa). The duration of each test shall be not less than 15 minutes.

Exception: For PEX piping systems, testing with a compressed gas shall be an alternative to hydrostatic testing where compressed air or other gas pressure testing is specifically authorized by all of the manufacturers' instructions for the PEX pipe

and fittings products installed at the time the system is being tested, and compressed air or other gas testing is not otherwise prohibited by applicable codes, laws, or regulations outside of this code.

SECTION M2102
BASEBOARD CONVECTORS

M2102.1 General. Baseboard convectors shall be installed in accordance with the manufacturer's instructions. Convectors shall be supported independently of the hydronic piping.

SECTION M2103
FLOOR HEATING SYSTEMS

M2103.1 Piping materials. Piping for embedment in concrete or gypsum materials shall be standard-weight steel pipe, copper and copper-alloy pipe and tubing, cross-linked polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX) pressure pipe, chlorinated polyvinyl chloride (CPVC), polybutylene, cross-linked polyethylene (PEX) tubing, polyethylene of raised temperature (PE-RT) or polypropylene (PP) with a rating of not less than 100 psi at 180°F (690 kPa at 82°C).

M2103.2 Thermal barrier required. Radiant floor heating systems shall have a thermal barrier in accordance with Sections M2103.2.1 and M2103.2.2. Insulation *R*-values for slab-on-grade and suspended floor installations shall be in accordance with Chapter 11.

Exception: Insulation shall not be required in engineered systems where it can be demonstrated that the insulation will decrease the efficiency or have a negative effect on the installation.

M2103.2.1 Thermal break required. A thermal break consisting of asphalt expansion joint materials or similar insulating materials shall be provided at a point where a heated slab meets a foundation wall or other conductive slab.

M2103.2.2 Thermal barrier material marking. Insulating materials used in thermal barriers shall be installed so that the manufacturer's *R*-value mark *is readily observable upon inspection.*

[W][S] M2103.3 Piping joints. Copper and copper-alloy systems shall be soldered, brazed, or press connected. Soldering shall be in accordance with ASTM B828. Fluxes for soldering shall be in accordance with ASTM B813. Brazing fluxes shall be in accordance with AWS A5.31. Press-connect joints shall be in accordance with ASME B16.51. Piping joints that are embedded shall be installed in accordance with the following requirements:

1. Steel pipe joints shall be welded.
2. Copper tubing shall be joined by brazing complying with Section ((~~P3003.6.1~~)) 605.3.1 of the *Uniform Plumbing Code*.
3. Polybutylene pipe and tubing joints shall be installed with socket-type heat-fused polybutylene fittings.
4. CPVC tubing shall be joined using solvent cement joints.
5. Polypropylene pipe and tubing joints shall be installed with socket-type heat-fused polypropylene fittings.
6. Cross-linked polyethylene (PEX) tubing shall be joined using cold expansion, insert or compression fittings.
7. Raised temperature polyethylene (PE-RT) tubing shall be joined using insert or compression fittings.

M2103.4 Testing. Piping or tubing to be embedded shall be tested by applying a hydrostatic pressure of not less than 100 psi (690 kPa). The pressure shall be maintained for 30 minutes, during which the joints shall be visually inspected for leaks.

SECTION M2104
LOW TEMPERATURE PIPING

M2104.1 Piping materials. Low temperature piping for embedment in concrete or gypsum materials shall be as indicated in Table M2101.1.

M2104.2 Piping joints. Piping joints that are embedded, other than those in Section M2103.3, shall comply with the following requirements:

1. Cross-linked polyethylene (PEX) tubing shall be installed in accordance with the manufacturer's instructions.
2. Polyethylene tubing shall be installed with heat-fusion joints.
3. Polypropylene (PP) tubing shall be installed in accordance with the manufacturer's instructions.
4. Raised temperature polyethylene (PE-RT) shall be installed in accordance with the manufacturer's instructions.

M2104.3 Raised temperature polyethylene (PE-RT) plastic tubing. Joints between raised temperature polyethylene tubing and fittings shall conform to Sections M2104.3.1 through M2104.3.3. Mechanical joints shall be installed in accordance with the manufacturer's instructions.

TABLE M2105.5
GROUND-SOURCE LOOP PIPE FITTINGS

PIPE MATERIAL	STANDARD
Chlorinated polyvinyl chloride (CPVC)	ASTM D2846; ASTM F437; ASTM F438; ASTM F439; ASTM F1970; CSA B137.6
Cross-linked polyethylene (PEX)	ASTM F877; ASTM F1807; ASTM F1960; ASTM F2080; ASTM F2159; ASTM F2434; CSA B137.5
High-density polyethylene (HDPE)	ASTM D2683; ASTM D3261; ASTM F1055; CSA B137.1; CSA C448; NSF 358-1
Polyethylene/aluminum/polyethylene (PE-AL-PE)	ASTM F1282; ASTM F2434; CSA B137.9
Polypropylene (PP-R)	ASTM F2389; CSA B137.11; NSF 358-2
Polyvinyl chloride (PVC)	ASTM D2464; ASTM D2466; ASTM D2467; ASTM F1970, CSA B137.2; CSA B137.3
Raised temperature polyethylene (PE-RT)	ASTM D2683; ASTM D3261; ASTM F1055; ASTM F1807; ASTM F2098; ASTM F2159; ASTM F2735; ASTM F2769; CSA B137.1; CSA B137.18

M2105.6 Joints and connections. Joints and connections shall be of an approved type. Joints and connections shall be tight for the pressure of the ground-source loop system. Joints used underground shall be approved for such applications.

M2105.6.1 Joints between different piping materials. Joints between different piping materials shall be made with approved transition fittings.

M2105.7 Preparation of pipe ends. Pipe shall be cut square, reamed, and shall be free of burrs and obstructions. CPVC, PE and PVC pipe shall be chamfered. Pipe ends shall have full-bore openings and shall not be undercut.

M2105.8 Joint preparation and installation. Where required by Sections M2105.9 through M2105.11, the preparation and installation of mechanical and thermoplastic-welded joints shall comply with Sections M2105.8.1 and M2105.8.2.

M2105.8.1 Mechanical joints. Mechanical joints shall be installed in accordance with the manufacturer's instructions.

M2105.8.2 Thermoplastic-welded joints. Joint surfaces for thermoplastic-welded joints shall be cleaned by an approved procedure. Joints shall be welded in accordance with the manufacturer's instructions.

[W][S] M2105.9 CPVC plastic pipe. Joints between CPVC plastic pipe or fittings shall be solvent-cemented in accordance with Section ((~~P2906.9.1.2~~)) 605.2.2 of the *Uniform Plumbing Code*. Threaded joints between fittings and CPVC plastic pipe shall be in accordance with Section M2105.9.1.

M2105.9.1 Threaded joints. Threads shall conform to ASME B1.20.1. The pipe shall be Schedule 80 or heavier plastic pipe and shall be threaded with dies specifically designed for plastic pipe. Thread lubricant, pipe-joint compound or tape shall be applied on the male threads only and shall be approved for application on the piping material.

M2105.10 Cross-linked polyethylene (PEX) plastic tubing. Joints between cross-linked polyethylene plastic tubing and fittings shall comply with Sections M2105.10.1 and M2105.10.2. Mechanical joints shall comply with Section M2105.8.1.

M2105.10.1 Compression-type fittings. Where compression-type fittings include inserts and ferrules or O-rings, the fittings shall be installed without omitting the inserts and ferrules or O-rings.

M2105.10.2 Plastic-to-metal connections. Solder joints in a metal pipe shall not occur within 18 inches (457 mm) of a transition from such metal pipe to plastic pipe or tubing.

M2105.11 Polyethylene plastic pipe and tubing. Joints between polyethylene plastic pipe and tubing or fittings for ground-source heat-pump loop systems shall be heat-fusion joints complying with Section M2105.11.1, electrofusion joints complying with Section M2105.11.2, or stab-type insertion joints complying with Section M2105.11.3.

M2105.11.1 Heat-fusion joints. Joints shall be of the socket-fusion, saddle-fusion or butt-fusion type, and joined in accordance with ASTM D2657. Joint surfaces shall be clean and free from moisture. Joint surfaces shall be heated to melt temperatures and joined. The joint shall remain undisturbed until cool. Fittings shall be manufactured in accordance with ASTM D2683 or ASTM D3261.

M2105.11.2 Electrofusion joints. Joints shall be of the electrofusion type. Joint surfaces shall be clean and free from moisture, and scoured to expose virgin resin. Joint surfaces shall be heated to melt temperatures for the period of time specified by the manufacturer. The joint shall remain undisturbed until cool. Fittings shall be manufactured in accordance with ASTM F1055.

M2105.11.3 Stab-type insert fittings. Joint surfaces shall be clean and free from moisture. Pipe ends shall be chamfered and inserted into the fittings to full depth. Fittings shall be manufactured in accordance with ASTM F1924.

M2105.12 Polypropylene (PP) plastic. Joints between PP plastic pipe and fittings shall comply with Sections M2105.12.1 and M2105.12.2.

M2105.12.1 Heat-fusion joints. Heat-fusion joints for polypropylene (PP) pipe and tubing joints shall be installed with socket-type heat-fused polypropylene fittings, electrofusion polypropylene fittings or by butt fusion. Joint surfaces shall be clean and free from moisture. The joint shall remain undisturbed until cool. Joints shall be made in accordance with ASTM F2389.

M2105.12.2 Mechanical and compression sleeve joints. Mechanical and compression sleeve joints shall be installed in accordance with the manufacturer's instructions.

M2105.13 Raised temperature polyethylene (PE-RT) plastic tubing. Joints between raised temperature polyethylene tubing and fittings shall comply with Sections M2105.13.1 through M2105.13.4. Mechanical joints shall comply with Section M2105.8.1.

M2105.13.1 Compression-type fittings. Where compression-type fittings include inserts and ferrules or O-rings, the fittings shall be installed without omitting the inserts and ferrules or O-rings.

M2105.13.2 PE-RT-to-metal connections. Solder joints in a metal pipe shall not occur within 18 inches (457 mm) of a transition from such metal pipe to PE-RT pipe or tubing.

M2105.13.3 Heat-fusion joints. Heat-fusion joints shall be of the socket-fusion, saddle-fusion or butt-fusion type, and shall be joined in accordance with ASTM D2657. Joint surfaces shall be clean and free from moisture. Joint surfaces shall be heated to melt temperatures and joined. The joint shall remain undisturbed until cool. Fittings shall be manufactured in accordance with ASTM D2683 or ASTM D3261.

M2105.13.4 Electrofusion joints. Joints shall be of the electrofusion type. Joint surfaces shall be clean and free from moisture and scoured to expose virgin resin. Joint surfaces shall be heated to melt temperatures for the period of time specified by the manufacturer and joined. The joint shall remain undisturbed until cool. Fittings shall be manufactured in accordance with ASTM F1055.

[W][S] M2105.14 PVC plastic pipe. Joints between PVC plastic pipe or fittings shall be solvent-cemented in accordance with Section ((~~P2906.9.1.4~~)) 605.12.2 of the *Uniform Plumbing Code*. Threaded joints between fittings and PVC plastic pipe shall be in accordance with Section M2105.9.1.

M2105.15 Shutoff valves. Shutoff valves shall be installed in ground-source loop piping systems in the locations indicated in Sections M2105.15.1 through M2105.15.6.

M2105.15.1 Heat exchangers. Shutoff valves shall be installed on the supply and return side of a heat exchanger.

Exception: Shutoff valves shall not be required where heat exchangers are integral with a boiler or are a component of a manufacturer's boiler and heat exchanger packaged unit and are capable of being isolated from the hydronic system by the supply and return valves required by Section M2001.3.

M2105.15.2 Central systems. Shutoff valves shall be installed on the building supply and return of a central utility system.

M2105.15.3 Pressure vessels. Shutoff valves shall be installed on the connection to any pressure vessel.

M2105.15.4 Pressure-reducing valves. Shutoff valves shall be installed on both sides of a pressure-reducing valve.

M2105.15.5 Equipment and appliances. Shutoff valves shall be installed on connections to mechanical equipment and appliances. This requirement does not apply to components of ground-source loop systems such as pumps, air separators, metering devices, and similar equipment.

M2105.15.6 Expansion tanks. Shutoff valves shall be installed at connections to nondiaphragm-type expansion tanks.

M2105.16 Reduced pressure. A pressure relief valve shall be installed on the low-pressure side of a hydronic piping system that has been reduced in pressure. The relief valve shall be set at the maximum pressure of the system design. The valve shall be installed in accordance with Section M2002.

M2105.17 Installation. Piping, valves, fittings, and connections shall be installed in accordance with the manufacturer's instructions.

[W][S] M2105.18 Protection of potable water. Where ground-source heat-pump ground-loop systems have a connection to a potable water supply, the potable water system shall be protected from backflow in accordance with Section ((~~P2902~~)) 603 of the *Uniform Plumbing Code*.

[W][S] M2105.19 Pipe penetrations. Openings for pipe penetrations in walls, floors and ceilings shall be larger than the penetrating pipe. Openings through concrete or masonry building elements shall be sleeved. The annular space surrounding pipe penetrations shall be protected in accordance with Section ((~~P2606.1~~)) Section 312 of the *Uniform Plumbing Code*.

M2105.20 Clearance from combustibles. A pipe in a ground-source heat pump piping system having an exterior surface temperature exceeding 250°F (121°C) shall have a clearance of not less than 1 inch (25 mm) from combustible materials.

CHAPTER 23

SOLAR THERMAL ENERGY SYSTEMS

User notes:

About this chapter: *Chapter 23 is specific to thermal solar systems and equipment. Solar voltaic systems are not addressed in this chapter. This chapter covers solar collectors, system design, safety devices, relief valves, freeze protection, expansion tanks, signage, labeling, heat transfer fluids, protection of potable water and potable water heating.*

Code development reminder: *Code change proposals to this chapter will be considered by the IRC—Plumbing/Mechanical Code Development Committee during the 2018 (Group A) Code Development Cycle. See explanation on page iv.*

SECTION M2301
SOLAR THERMAL ENERGY SYSTEMS

M2301.1 General. This section provides for the design, construction, installation, *alteration* and repair of *equipment* and systems using solar thermal energy to provide space heating or cooling, hot water heating and swimming pool heating.

M2301.2 Design and installation. The design and installation of solar thermal energy systems shall comply with Sections M2301.2.1 through M2301.2.13.

M2301.2.1 Access. Access shall be provided to solar energy *equipment* for maintenance. Solar systems and appurtenances shall not obstruct or interfere with the operation of any doors, windows or other building components requiring operation or access. Roof-mounted solar thermal equipment shall not obstruct or interfere with the operation of roof-mounted equipment, appliances, chimneys, plumbing vents, roof hatches, smoke vents, skylights and other roof penetrations and openings.

M2301.2.2 Collectors and panels. Solar collectors and panels shall comply with Sections M2301.2.2.1 and M2301.2.2.2.

M2301.2.2.1 Roof-mounted collectors. The roof shall be constructed to support the loads imposed by roof-mounted solar collectors. Roof-mounted solar collectors that serve as a roof covering shall conform to the requirements for roof coverings in Chapter 9 of this code. Where mounted on or above the roof coverings, the collectors and supporting structure shall be constructed of noncombustible materials or fire-retardant-treated wood equivalent to that required for the roof construction.

M2301.2.2.2 Collector sensors. Collector sensor installation, sensor location and the protection of exposed sensor wires from degradation shall be in accordance with ICC 900/SRCC 300.

[W][S] M2301.2.3 Pressure and temperature relief valves and system components. System components containing fluids shall be protected with temperature and pressure relief valves or pressure relief valves. Relief devices shall be installed in sections of the system so that a section cannot be valved off or isolated from a relief device. Direct systems and the potable water portion of indirect systems shall be equipped with a relief valve in accordance with Section ((~~P2804~~)) 504 of the *Uniform Plumbing Code*. For indirect systems, pressure relief valves in solar loops shall comply with ICC 900/SRCC 300. System components shall have a working pressure rating of not less than the setting of the pressure relief device.

M2301.2.4 Vacuum relief. System components that might be subjected to a vacuum during operation or shutdown shall be designed to withstand such a vacuum or shall be protected with vacuum relief valves.

[W][S] M2301.2.5 Piping insulation. Piping shall be insulated in accordance with the requirements of ((~~Chapter 11~~)) the residential portion of the *Seattle Energy Code*. Exterior insulation shall be protected from ultraviolet degradation. The entire solar loop shall be insulated. Where split-style insulation is used, the seam shall be sealed. Fittings shall be fully insulated.

Exceptions:

1. Those portions of the piping that are used to help prevent the system from overheating shall not be required to be insulated.
2. Those portions of piping that are exposed to solar radiation, made of the same material as the solar collector absorber plate and are covered in the same manner as the solar collector absorber, or that are used to collect additional solar energy, shall not be required to be insulated.
3. Piping in thermal solar systems using unglazed solar collectors to heat a swimming pool shall not be required to be insulated.

M2301.2.6 Protection from freezing. System components shall be protected from damage resulting from freezing of heat-transfer liquids at the winter design temperature provided in Table R301.2(1). Freeze protection shall be provided in accor-

dance with ICC 900/SRCC 300. Drain-back systems shall be installed in compliance with Section M2301.2.6.1. Systems utilizing freeze-protection valves shall comply with Section M2301.2.6.2.

Exception: Where the 97.5-percent winter design temperature is greater than or equal to 48°F (9°C).

M2301.2.6.1 Drain-back systems. Drain-back systems shall be designed and installed to allow for manual gravity draining of fluids from areas subject to freezing to locations not subject to freezing, and air filling of the components and piping. Such piping and components shall maintain a horizontal slope in the direction of flow of not less than one-fourth unit vertical in 12 units horizontal (2-percent slope). Piping and components subject to manual gravity draining shall permit subsequent air filling upon drainage and air venting upon refilling.

M2301.2.6.2 Freeze-protection valves. Freeze-protection valves shall discharge in a manner that does not create a hazard or structural damage.

M2301.2.7 Storage tank sensors. Storage tank sensors shall comply with ICC 900/SRCC 300.

M2301.2.8 Expansion tanks. Expansion tanks in solar energy systems shall be installed in accordance with Section M2003 in solar collector loops that contain pressurized heat transfer fluid. Where expansion tanks are used, the system shall be designed in accordance with ICC 900/SRCC 300 to provide an expansion tank that is sized to withstand the maximum operating pressure of the system.

Exception: Expansion tanks shall not be required in the collector loop of *drain-back systems*.

M2301.2.9 Roof and wall penetrations. Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 to prevent entry of water, rodents and insects.

M2301.2.10 Description and warning labels. Solar thermal systems shall comply with description label and warning label requirements of Section M2301.2.11.2 and ICC 900/SRCC 300.

M2301.2.11 Solar loop. Solar loops shall be in accordance with Sections M2301.2.11.1 and M2301.2.11.2.

M2301.2.11.1 Solar loop isolation. Valves shall be installed to allow the solar loop to be isolated from the remainder of the system.

M2301.2.11.2 Drain and fill valve labels and caps. Drain and fill valves shall be labeled with a description and warning that identifies the fluid in the solar loop and a warning that the fluid might be discharged at high temperature and pressure. Drain caps shall be installed at drain and fill valves.

M2301.2.12 Maximum temperature limitation. Systems shall be equipped with means to limit the maximum water temperature of the system fluid entering or exchanging heat with any pressurized vessel inside the *dwelling* to 180°F (82°C). This protection is in addition to the required temperature and pressure relief valves required by Section M2301.2.3.

M2301.2.13 Thermal storage unit seismic bracing. In Seismic Design Categories D_0, D_1 and D_2 and in townhouses in Seismic Design Category C, thermal storage units shall be anchored in accordance with Section M1307.2.

M2301.3 Labeling. *Labeling* shall comply with Sections M2301.3.1 and M2301.3.2.

M2301.3.1 Collectors and panels. Solar thermal collectors and panels shall be listed and labeled in accordance with ICC 901/SRCC 100. Factory-built collectors shall bear a label indicating the manufacturer's name, model number and serial number.

M2301.3.2 Thermal storage units. Pressurized water storage tanks shall bear a label indicating the manufacturer's name and address, model number, serial number, storage unit maximum and minimum allowable operating temperatures and storage unit maximum and minimum allowable operating pressures. The *label* shall clarify that these specifications apply only to the water storage tanks.

[W][S] M2301.4 Heat transfer gases or liquids and heat exchangers. *Essentially toxic transfer fluids*, ethylene glycol, flammable gases and flammable liquids shall not be used as heat transfer fluids. Heat transfer gases and liquids shall be rated to withstand the system's maximum design temperature under operating conditions without degradation. Heat exchangers used in solar thermal systems shall comply with Section ((~~P2902.5.2~~)) 603.5.4 of the *Uniform Plumbing Code* and ICC 900/SRCC 300.

Heat transfer fluids shall be in accordance with SRCC 300. The flash point of the heat transfer fluids utilized in solar thermal systems shall be not less than 50°F (28°C) above the design maximum nonoperating or no-flow temperature attained by the fluid in the collector.

M2301.5 Backflow protection. Connections from the potable water supply to solar systems shall comply with ((~~Section P2902.5.5~~)) the *Uniform Plumbing Code*.

M2301.6 Filtering. Air provided to occupied spaces that passes through thermal mass storage systems by mechanical means shall be filtered for particulates at the outlet of the thermal mass storage system.

M2301.7 Solar thermal systems for heating potable water. Where a solar thermal system heats potable water to supply a potable hot water distribution system, the solar thermal system shall be in accordance with Sections M2301.7.1, M2301.7.2 and ((~~P2902.5.5~~)) the *Uniform Plumbing Code*.

[S] M2301.7.1 Indirect systems. Heat exchangers that are components of indirect solar thermal heating systems shall comply with ((~~Section P2902.5.2~~)) the *Uniform Plumbing Code*.

[S] M2301.7.2 Direct systems. Where potable water is directly heated by a solar thermal system, the pipe, fittings, valves and other components that are in contact with the potable water in the solar heating system shall comply with the requirements of Chapter ((~~29~~)) 6 of the *Uniform Plumbing Code*.

Part VII—Plumbing

CHAPTERS 25 through 28

Note: Chapters 25 through 28 are not adopted in The City of Seattle. See the *Uniform Plumbing Code.*

CHAPTER 29

WATER SUPPLY AND DISTRIBUTION

User notes:

About this chapter: *Many plumbing fixtures require a supply of potable water. Other fixtures could be supplied with nonpotable water such as reclaimed water. Chapter 29 covers the requirements for water distribution piping systems to and within buildings. The regulations include the types of materials and the connection methods for such systems. This chapter regulates the assemblies, devices and methods that are used for the prevention of backflow of contaminated or polluted water into the potable water system. Also contained in this chapter are the design requirements for the installation of fire sprinkler systems, as such systems are connected to the potable water supply for the building. Storm water and some liquid waste from a building can be a source of nonpotable water that can used to reduce the volume of potable water supplied to the building. This chapter provides the requirements for storage, treatment and distribution of this resource. This chapter also regulates the piping systems for reclaimed water supplied by a wastewater treatment facility.*

Code development reminder: *Code change proposals to this chapter will be considered by the IRC—Mechanical/Plumbing Code Development Committee during the 2018 (Group A) Code Development Cycle. See explanation on page iv.*

Sections of Chapter 29 not shown are not adopted by The City of Seattle.

SECTION P2904
DWELLING UNIT FIRE SPRINKLER SYSTEMS

P2904.1 General. The design and installation of residential fire sprinkler systems shall be in accordance with NFPA 13D or Section P2904, which shall be considered to be equivalent to NFPA 13D. Partial residential sprinkler systems shall be permitted to be installed only in buildings not required to be equipped with a residential sprinkler system. Section P2904 shall apply to stand-alone and multipurpose wet-pipe sprinkler systems that do not include the use of antifreeze. A multipurpose fire sprinkler system shall provide domestic water to both fire sprinklers and plumbing fixtures. A stand-alone sprinkler system shall be separate and independent from the water distribution system. A backflow preventer shall not be required to separate a sprinkler system from the water distribution system, provided that the sprinkler system complies with all of the following:

1. The system complies with NFPA 13D or Section P2904.
2. The piping material complies with Section P2906.
3. The system does not contain antifreeze.
4. The system does not have a fire department connection.

P2904.1.1 Required sprinkler locations. Sprinklers shall be installed to protect all areas of a *dwelling unit*.

Exceptions:

1. ((~~Attics~~)) Uninhabitable attics, crawl spaces and normally unoccupied concealed spaces that do not contain fuel-fired appliances do not require sprinklers. In uninhabitable *attics*, crawl spaces and normally unoccupied concealed spaces that contain fuel-fired equipment, a sprinkler shall be installed above the equipment; however, sprinklers shall not be required in the remainder of the space.
2. Clothes closets, linen closets and pantries not exceeding 24 square feet (2.2 m^2) in area, with the smallest dimension not greater than 3 feet (915 mm) and having wall and ceiling surfaces of gypsum board.
3. Bathrooms not more than 55 square feet (5.1 m^2) in area.
4. Garages; carports; exterior porches; unheated entry areas, such as mud rooms, that are adjacent to an exterior door; and similar areas.

P2904.2 Sprinklers. Sprinklers shall be new listed residential sprinklers and shall be installed in accordance with the sprinkler manufacturer's instructions.

P2904.2.1 Temperature rating and separation from heat sources. Except as provided for in Section P2904.2.2, sprinklers shall have a temperature rating of not less than 135°F (57°C) and not more than 170°F (77°C). Sprinklers shall be separated from heat sources as required by the sprinkler manufacturer's installation instructions.

P2904.2.2 Intermediate temperature sprinklers. Sprinklers shall have an intermediate temperature rating not less than 175°F (79°C) and not more than 225°F (107°C) where installed in the following locations:

1. Directly under skylights, where the sprinkler is exposed to direct sunlight.
2. In *attics*.
3. In concealed spaces located directly beneath a roof.

CHAPTER 30

SANITARY DRAINAGE

Chapters 30 through 43 are not adopted by The City of Seattle.

ACI—continued

332—14: Residential Code Requirements for Structural Concrete
R402.2, R403.1, R404.1.3, R404.1.3.4, R404.1.4.2, R506.1

AISI

American Iron and Steel Institute
25 Massachusetts Avenue, NW Suite 800
Washington, DC 20001

AISI S100—16: North American Specification for the Design of Cold-formed Steel Structural Members, 2016
R608.9.2, R608.9.3

AISI S220—15: North American Standard for Cold-formed Steel Framing—Nonstructural Members, 2015
R702.3.3

AISI S230—15: Standard for Cold-formed Steel Framing—Prescriptive Method for One- and Two-family Dwellings, 2015
R301.1.1, R301.2.1.1, R301.2.2.7, R301.2.2.8, R603.6, R603.9.4.1, R603.9.4.2, R608.9.2, R608.9.3, Figure 608.9(11), R608.10

AISI S240—15: North American Standard for Cold-Formed Steel Structural Framing
R505.1.3, R603.6, R702.3.3, R804.3.6

AMCA

Air Movement and Control Association International
30 West University Drive
Arlington Heights, IL 60004

ANSI/AMCA 210-ANSI/ASHRAE 51—07: Laboratory Methods of Testing Fans for Aerodynamic Performance Rating
Table M1505.3

ANCE

Association of the Electric Sector
Av. Lázaro Cardenas No. 869
Col. Nueva Industrial Vallejo
C.P. 07700 México D.F.

NMX-J-521/2-40-ANCE—((~~2014~~)) 2019/CAN/CSA-22.2 No. 60335-2-40—((~~12~~)) 19/UL 60335-2-40-2019: ((~~Safety of~~)) Household and Similar Electric Appliances ((~~,~~)) – Part 2-40: Particular Requirements for Heat Pumps, Air-Conditioners and Dehumidifiers
M1403.1, M1412.1, M1413.1

ANSI

American National Standards Institute
25 West 43rd Street, 4th Floor
New York, NY 10036

A108.1A—16: Installation of Ceramic Tile in the Wet-set Method, with Portland Cement Mortar
R702.4.1

A108.1B—99: Installation of Ceramic Tile, Quarry Tile on a Cured Portland Cement Mortar Setting Bed with Dry-set or Latex Portland Mortar
R702.4.1

A108.4—99: Installation of Ceramic Tile with Organic Adhesives or Water-Cleanable Tile-setting Epoxy Adhesive
R702.4.1

A108.5—99: Installation of Ceramic Tile with Dry-set Portland Cement Mortar or Latex Portland Cement Mortar
R702.4.1

A108.6—99: Installation of Ceramic Tile with Chemical-resistant, Water-cleanable Tile-setting and -grouting Epoxy
R702.4.1

A108.11—99: Interior Installation of Cementitious Backer Units
R702.4.1

ANSI 117—2015: Standard Specifications for Structural Glued Laminated Timber of Softwood Species
R502.1.3, R602.1.3, R802.1.3

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R702.4.1

ANSI—continued

A118.3—13: American National Standard Specifications for Chemical-resistant, Water-cleanable Tile-setting and -grouting Epoxy, and Water-cleanable Tile-setting Epoxy Adhesive
R702.4.1

A118.4—16: American National Standard Specifications for Modified Dry-Set Cement Mortar
R606.2.11

A118.10—99: Specification for Load-bearing, Bonded, Waterproof Membranes for Thin-set Ceramic Tile and Dimension Stone Installation
P2709.2, P2709.2.4

A136.1—08: American National Standard Specifications for Organic Adhesives for Installation of Ceramic Tile
R702.4.1

A137.1—17: American National Standard Specifications for Ceramic Tile
R702.4.1

LC1/CSA 6.26—((~~13~~)) 18: Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing (CSST)
G2414.5.4, G2411.3, G2415.5

LC4/CSA 6.32—12: Press-connect Metallic Fittings for Use in Fuel Gas Distribution Systems
G2414.10.1, G2414.10.2, G2414.10.3, G2415.5

Z21.1—2010: Household Cooking Gas Appliances
G2447.1, M1503.2

Z21.5.1/CSA 7.1—14: Gas Clothes Dryers—Volume I—Type I Clothes Dryers
G2438.1

Z21.8—94 (R2002): Installation of Domestic Gas Conversion Burners
G2443.1

Z21.10.1/CSA 4.1—12: Gas Water Heaters—Volume I—Storage Water Heaters with Input Ratings of 75,000 Btu per hour or Less
G2448.1

Z21.10.3/CSA 4.3—11: Gas Water Heaters—Volume III—Storage Water Heaters with Input Ratings above 75,000 Btu per hour, Circulating and Instantaneous
G2448.1

Z21.11.2—11: Gas-fired Room Heaters—Volume II—Unvented Room Heaters
G2445.1

Z21.13/CSA 4.9—11: Gas-fired Low-pressure Steam and Hot Water Boilers
G2452.1

Z21.15/CSA 9.1—09: Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves
Table G2420.1.1

Z21.22—99 (R2003): Relief Valves for Hot Water Supply Systems—with Addenda Z21.22a—2000 (R2003) and 21.22b—2001 (R2003)
P2804.2, P2804.7

Z21.24/CSA 6.10—06: Connectors for Gas Appliances
G2422.1, G2422.2

Z21.40.1/CSA 2.91—96 (R2011): Gas-fired, Heat-activated Air-conditioning and Heat Pump Appliances
G2449.1

Z21.40.2/CSA 2.92—96 (R2011): Air-conditioning and Heat Pump Appliances (Thermal Combustion)
G2449.1

Z21.42—2014: Gas-fired Illuminating Appliances
G2450.1

Z21.47/CSA 2.3—12: Gas-fired Central Furnaces
G2442.1

Z21.50/CSA 2.22—16: Vented Gas Fireplaces
G2434.1

Z21.54—2009: Gas Hose Connectors for Portable Outdoor Gas-fired Appliances
G2422.1

Z21.56/CSA 4.7—17: Gas-fired Pool Heaters
G2441.1

APSP

The Association of Pool & Spa Professionals
211 Eisenhower Avenue, Suite 500
Alexander, VA 22314

ANSI/APSP/ICC 14—2014: American National Standard for Portable Electric Spa Energy Efficiency
N1103.11

ANSI/APSP/ICC 15a—2011: American National Standard for Residential Swimming Pool and Spa Energy Efficiency—includes Appendix A Approved January 9, 2013
N1103.12

ASCE/SEI

American Society of Civil Engineers
Structural Engineering Institute
1801 Alexander Bell Drive
Reston, VA 20191-4400

7—16: Minimum Design Loads and Associated Criteria for Buildings and Other Structures
R301.2.1.1, R301.2.1.2, R301.2.1.2.1, R301.2.1.5, R301.2.1.5.1, Table R608.6(1), Table R608.6(2), Table R608.6(3), Table R608.6(4), Table R608.7(1A), Table R608.7(1B), Table R608.7(1C), R608.9.2, R608.9.3, R609.2, R609.6.2, AH107.4.3

24—14: Flood-resistant Design and Construction
R301.2.4, R301.2.4.1, R322.1, R322.1.1, R322.1.6, R322.1.9, R322.2.2, R322.3.3

32—01: Design and Construction of Frost-protected Shallow Foundations
R403.1.4.1

ASHRAE

ASHRAE
1791 Tullie Circle NE
Atlanta, GA 30329

ASHRAE—2001: 2001 ASHRAE Handbook of Fundamentals
Table N1105.5.2(1)

ASHRAE—2017: ASHRAE Handbook of Fundamentals
N1102.1.5, P3001.2, P3101.4

ASHRAE 193—2010(RA 2014): Method of Test for Determining Air Tightness of HVAC Equipment
N1103.3.2.1

34—((~~2016~~)) 2019: Designation and Safety Classification of Refrigerants
M1411.1

ASME

American Society of Mechanical Engineers
Two Park Avenue
New York, NY 10016-5990

ASME A17.1—2016/CSA B44—16: Safety Code for Elevators and Escalators
R321.1

A18.1—2014: Safety Standard for Platforms and Stairway Chair Lifts
R321.2

A112.1.2—2012: Air Gaps in Plumbing Systems (For Plumbing Fixtures and Water Connected Receptors)
P2717.1, Table P2902.3, P2902.3.1

A112.1.3—2000 (Reaffirmed 2015): Air Gap Fittings for Use with Plumbing Fixtures, Appliances and Appurtenances
Table P2701.1, P2717.1, Table P2902.3, P2902.3.1

A112.3.1—2007(R2012): Stainless Steel Drainage Systems for Sanitary, DWV, Storm and Vacuum Applications Above and Below Ground
Table P3002.1(1), Table P3002.1(2), Table P3002.2, Table P3002.3, Table P3302.1

A112.3.4—2013/CSA B45.9—13: Macerating Toilet Systems and Related Components
Table P2701.1, P3007.5

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D7793—13: Standard Specification for Insulated Vinyl Siding
R703.13, Table R703.3(1)

E84—2016: Standard Test Method for Surface Burning Characteristics of Building Materials
R202, R302.9.3, R302.9.4, R302.10.1, R302.10.2, R316.3, R316.5.9, R316.5.11, R507.2.2.2, R703.14.3, R802.1.5, M1601.3, M1601.5.2, P2801.6

E96/E96M—2015: Test Method for Water Vapor Transmission of Materials
R202, Table R806.5, M1411.6, M1601.4.6

E108—2016: Test Methods for Fire Tests of Roof Coverings
R302.2.4, R902.1

E119—2016: Test Methods for Fire Tests of Building Construction and Materials
Table R302.1(1), Table R302.1(2), R302.2.1, R302.2.2, R302.3, R302.4.1, R302.11.1, R606.2.2

E136—2016: Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C
R202, R302.11

E283—04(2012): Test Method for Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences across the Specimen
R202, N1102.4.5

E330/E330M—14: Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference
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E331—00(2009): Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference
R703.1.1

E779—10: Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
N1102.4.1.2

E814—2013A: Standard Test Method for Fire Tests of Penetration Firestop Systems
R302.4.1.2

E970—14: Standard Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source
R302.10.5

E1509—12: Standard Specification for Room Heaters, Pellet Fuel-burning Type
M1410.1

E1602—03(2010)e1: Guide for Construction of Solid Fuel Burning Masonry Heaters
R1002.2

E1827—11: Standard Test Methods for Determining Airtightness of Building Using an Orifice Blower Door
N1102.4.1.2

E1886—13A: Test Method for Performance Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials
R301.2.1.2, R609.6.1, R609.6.2, Table R703.11.2

E1996—2014a: Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes
R301.2.1.2, R301.2.1.2.1, R609.6.1, R609.6.2

E2178—2013: Standard Test Method for Air Permeance of Building Materials
R202

E2231—15: Standard Practice for Specimen Preparation and Mounting of Pipe and Duct Insulation Materials to Assess Surface Burning Characteristics
M1601.3

E2556/E2556M—10: Standard Specification for Vapor Permeable Flexible Sheet Water-resistive Barriers Intended for Mechanical Attachment

E2273—03(2011): Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies
R703.9.2

E2568—09e1: Standard Specification for PB Exterior Insulation and Finish Systems
R703.9.1, R703.9.2

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B137.9—16: Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe Systems
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B137.10—13: Cross-linked Polyethylene/Aluminum/Cross-linked Polyethylene (PE-AL-PE) Composite Pressure Pipe Systems
Table M2101.1, Table P2906.4, Table P2906.5, Table P2906.6, P2906.12.1

B137.11—16: Polypropylene (PP-R) Pipe and Fittings for Pressure Applications
Table P2906.4, Table P2906.5, Table P2906.6, Table AG101.1

B137.18—13: Polyethylene of Raised Temperature (PE-RT) Tubing Systems for Pressure Applications
Table M2101.1, Table M2105.4, Table M2105.5, Table P2906.4, Table P2906.5, Table P2906.6

B181.1—15: Acrylonitrile-butadiene-styrene (ABS) Drain, Waste and Vent Pipe and Pipe Fittings
Table P3002.1(1), Table P3002.1(2), Table P3002.3, P3003.3.2

B181.2—15: Polyvinylchloride (PVC) and chlorinated polyvinylchloride (CPVC) Drain, Waste and Vent Pipe and Pipe Fittings
Table P3002.1(1), Table P3002.1(2), P3003.9.2, P3008.3

B181.3—15: Polyolefin and polyvinylidene (PVDF) Laboratory Drainage Systems
Table P3002.1(1), Table P3002.1(2), Table P3002.2, Table P3002.3, P3003.11.1

B182.2—11: PSM Type polyvinylchloride (PVC) Sewer Pipe and Fittings
Table P3002.2, Table P3302.1

B182.4—15: Profile polyvinylchloride (PVC) Sewer Pipe & Fittings
Table P3002.2, Table P3302.1

B182.6—15: Profile Polyethylene (PE) Sewer Pipe and Fittings for leak-proof Sewer Applications
Table P3302.1

B182.8—15: Profile Polyethylene (PE) Storm Sewer and Drainage Pipe and Fittings
Table P3302.1

B356—10: Water Pressure Reducing Valves for Domestic Water Supply Systems
P2903.3.1

B483.1—07(R2012): Drinking Water Treatment Systems
P2909.1, P2909.2

B602—15: Mechanical Couplings for Drain, Waste and Vent Pipe and Sewer Pipe
P3003.3.1, P3003.4.3,P3003.5, P3003.9.1, P3003.10, P3003.12.2, P3003.13

CSA B45.5—17/IAPMO Z124—17: Plastic Plumbing Fixtures
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M2006.1

C22.2 No. 236—15: Heating and Cooling Equipment
M2006.1

CSA C448 Series—16: Design and Installation of Earth Energy Systems
Table M2105.4, Table M2105.5

CSA O325—07: Construction Sheathing
R503.2.1, R602.1.8, R604.1, R803.2.1

O437-Series—93: Standards on OSB and Waferboard (Reaffirmed 2006)
R503.2.1, R602.1.8, R604.1, R803.2.1

CAN/CSA/C22.2 No. 60335-2-40—((~~2012~~)) 2019: ((~~Safety of~~)) Household and Similar Electrical Appliances, Part 2-40 ((~~:~~)) – Safety: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers
((~~M1403.1, M1412.1, M1413.1~~)) M2006.1

CSSB

Cedar Shake & Shingle Bureau
P.O. Box 1178
Sumas, WA 98295-1178

CSSB—97: Grading and Packing Rules for Western Red Cedar Shakes and Western Red Shingles of the Cedar Shake and Shingle Bureau
R702.6, R703.6

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1563—2009: Standard for Electric Spas, Hot Tubs and Associated Equipment—with revisions through March 2015
M2006.1

1618—09: Wall Protectors, Floor Protectors, and Hearth Extensions—with revisions through October 2015
R1004.2, M1410.2

1693—2010: Electric Radiant Heating Panels and Heating Panel Sets—with revisions through October 2011
M1406.1

1703—02: Flat-plate Photovoltaic Modules and Panels—with revisions through October 2015
R324.3.1, R902.4, R905.16.4, R907.17.5

1715—97: Fire Test of Interior Finish Material—with revisions through January 2013
R316.6

1738—2010: Venting Systems for Gas-burning Appliances, Categories II, III and IV—with revisions through November 2014
G2426.1, G2427.4.1, G2427.4.1.1, G2427.4.2

1741—2010: Inverters, Converters, Controllers and Interconnection System Equipment with Distributed Energy Resources—with revisions through January 2015
R324.3.1, R327.4

1777—07: Chimney Liners—with revisions through October 2015
R1003.11.1, R1003.18, G2425.12, G2425.15.4, M1801.3.4, G2427.5.1, G2427.5.2

1897—12: Uplift Tests for Roof Covering Systems—with revisions through September 2015
R905.17.7

1995—2011: Heating and Cooling Equipment—with revisions through July 2015
M1402.1, M1403.1, M1407.1, M1412.1, M1413.1, M2006.1

1996—2009: Electric Duct Heaters—with revisions through June 2014
M1402.1, M1407.1

2034—08: Standard for Single- and Multiple-station Carbon Monoxide Alarms—with revisions through March 2015
R314.1.1, R315.1.1

2075—2013: Standard for Gas and Vapor Detectors and Sensors
R314.7.4, R315.7.1, R315.7.4

2158A—2010: Outline of Investigation for Clothes Dryer Transition Duct
M1502.4.3, G2439.7.3

2523—09: Standard for Solid Fuel-fired Hydronic Heating Appliances, Water Heaters and Boilers—with revisions through February 2013
M2005.1, M2001.1.1

2703—14: Mounting Systems, Mounting Devices, Clamping/Retention Devices and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels
R902.4

9540—14: Outline of Investigation for Energy Storage Systems and Equipment
R327.2, R327.4

UL/CSA/ANCE 60335-2-40—((~~2012~~)) 2019: ((~~Standard for~~)) Household and Similar Electrical Appliances ((~~,~~)) – Safety: Part 2-40: Particular Requirements for ((~~Motor-compressors~~)) Electrical Heat Pumps, Air Conditioners and Dehumidifiers
M1403.1, M1412.1, M1413.1

ULC

ULC
13775 Commerce Parkway
Richmond, BC V6V 2V4

CAN/ULC S 102.2—2010: Standard Methods for Test for Surface Burning Characteristics of Building Materials and Assemblies
R302.10.1, R302.10.2

US-FTC

United States-Federal Trade Commission
600 Pennsylvania Avenue NW
Washington, DC 20580

CFR Title 16(2015): R-value Rule
N1101.10.4

APPENDICES A through E

Note: Appendices A through E are not adopted by The City of Seattle.

APPENDIX F

RADON CONTROL METHODS

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

User note:

About this appendix: *Appendix F contains provisions that are intended to mitigate the transfer of radon gases from the soil into dwelling units. Radon is a radioactive gas that has been identified as a cancer-causing agent. Radon comes from the natural breakdown of uranium in soil, rock and water.*

SECTION AF101
SCOPE

AF101.1 General. This appendix contains requirements for new construction in *jurisdictions* where radon-resistant construction is required.

Inclusion of this appendix by jurisdictions shall be determined through the use of locally available data or determination of Zone 1 designation in Figure AF101 and Table AF101(1).

SECTION AF102
DEFINITIONS

AF102.1 General. For the purpose of these requirements, the terms used shall be defined as follows:

DRAIN TILE LOOP. A continuous length of drain tile or perforated pipe extending around all or part of the internal or external perimeter of a *basement* or crawl space footing.

RADON GAS. A naturally occurring, chemically inert, radioactive gas that is not detectable by human senses. As a gas, it can move readily through particles of soil and rock, and can accumulate under the slabs and foundations of homes where it can easily enter into the living space through construction cracks and openings.

SOIL-GAS-RETARDER. A continuous membrane of 6-mil (0.15 mm) polyethylene or other equivalent material used to retard the flow of soil gases into a building.

SUBMEMBRANE DEPRESSURIZATION SYSTEM. A system designed to achieve lower submembrane air pressure relative to crawl space air pressure by use of a vent drawing air from beneath the soil-gas-retarder membrane.

SUBSLAB DEPRESSURIZATION SYSTEM (Active). A system designed to achieve lower subslab air pressure relative to indoor air pressure by use of a fan-powered vent drawing air from beneath the slab.

SUBSLAB DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower subslab air pressure relative to indoor air pressure by use of a vent pipe routed through the *conditioned space* of a building and connecting the subslab area with outdoor air, thereby relying on the convective flow of air upward in the vent to draw air from beneath the slab.

SECTION AF103
REQUIREMENTS

[W] AF103.1 General. The following construction techniques are intended to resist radon entry and prepare the building for post-construction radon mitigation, if necessary (see Figure AF103). These techniques are required in ((~~areas~~)) high radon potential counties where designated ((~~by the *jurisdiction*~~)) in Table AF101(1).

AF103.2 Subfloor preparation. A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the living spaces of the building, to facilitate future installation of a subslab depressurization system, if needed. The gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate, not less than 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a $^{1}/_{4}$-inch (6.4 mm) sieve.
2. A uniform layer of sand (native or fill), not less than 4 inches (102 mm) thick, overlain by a layer or strips of geotextile drainage matting designed to allow the lateral flow of soil gases.
3. Other materials, systems or floor designs with demonstrated capability to permit depressurization across the entire subfloor area.

APPENDICES G through P

Note: Appendices G through P are not adopted by The City of Seattle.

APPENDIX Q

TINY HOUSES

This provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

User note:

About this appendix: *Appendix Q relaxes various requirements in the body of the code as they apply to houses that are 400 square feet in area or less. Attention is specifically paid to features such as compact stairs, including stair handrails and headroom, ladders, reduced ceiling heights in lofts and guard and emergency escape and rescue opening requirements at lofts.*

SECTION AQ101
GENERAL

AQ101.1 Scope. This appendix shall be applicable to *tiny houses* used as single *dwelling units*. *Tiny houses* shall comply with this code except as otherwise stated in this appendix.

SECTION AQ102
DEFINITIONS

AQ102.1 General. The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.

[W] ((~~EGRESS ROOF ACCESS WINDOW.~~ ~~A *skylight* or roof window designed and installed to satisfy the emergency escape and rescue opening requirements of Section R310.2.~~))

[W] ((~~LANDING PLATFORM.~~ ~~A landing provided as the top step of a stairway accessing a *loft*.~~))

[W] ((~~LOFT.~~ ~~A floor level located more than 30 inches (762 mm) above the main floor, open to the main floor on one or more sides with a ceiling height of less than 6 feet 8 inches (2032 mm) and used as a living or sleeping space.~~))

[W] TINY HOUSE. A *dwelling unit* that is 400 square feet (37 m^2) or less in floor area excluding sleeping *lofts*.

SECTION AQ103
CEILING HEIGHT

[W] AQ103.1 Minimum ceiling height. *Habitable space* ((~~and hallways~~)) in *tiny houses* shall have a ceiling height of not less than 6 feet 8 inches (2032 mm). Bathrooms, toilet rooms and kitchens shall have a ceiling height of not less than 6 feet 4 inches (1930 mm). Obstructions including, but not limited to, beams, girders, ducts and lighting, shall not extend below these minimum ceiling heights.

Exception: Ceiling heights in *sleeping lofts* ((~~are permitted to~~)) shall be ((~~less than 6 feet 8 inches (2032 mm)~~)) in accordance with Section R326.

[W] SECTION AQ104
((~~LOFTS~~)) ENERGY CONSERVATION

((~~**AQ104.1 Minimum loft area and dimensions.** *Lofts* used as a sleeping or living space shall meet the minimum area and dimension requirements of Sections AQ104.1.1 through AQ104.1.3.~~

~~**AQ104.1.1 Minimum area.** *Lofts* shall have a floor area of not less than 35 square feet (3.25 m^2).~~

~~**AQ104.1.2 Minimum dimensions.** *Lofts* shall be not less than 5 feet (1524 mm) in any horizontal dimension.~~

~~**AQ104.1.3 Height effect on loft area.** Portions of a *loft* with a sloped ceiling measuring less than 3 feet (914 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required area for the loft.~~

~~**Exception:** Under gable roofs with a minimum slope of 6 units vertical in 12 units horizontal (50-percent slope), portions of a *loft* with a sloped ceiling measuring less than 16 inches (406 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required area for the *loft*.~~

~~**AQ104.2 Loft access.** The access to and primary egress from *lofts* shall be of any type described in Sections AQ104.2.1 through AQ104.2.4.~~

~~**AQ104.2.1 Stairways.** Stairways accessing *lofts* shall comply with this code or with Sections AQ104.2.1.1 through AQ104.2.1.5.~~

~~**AQ104.2.1.1 Width.** Stairways accessing a *loft* shall not be less than 17 inches (432 mm) in clear width at or above the handrail. The width below the handrail shall be not less than 20 inches (508 mm).~~

~~**AQ104.2.1.2 Headroom.** The headroom in stairways accessing a *loft* shall be not less than 6 feet 2 inches (1880 mm), as measured vertically, from a sloped line connecting the tread or landing platform nosings in the middle of their width.~~

~~**AQ104.2.1.3 Treads and risers.** Risers for stairs accessing a *loft* shall be not less than 7 inches (178 mm) and not more than 12 inches (305 mm) in height. Tread depth and riser height shall be calculated in accordance with one of the following formulas:~~

~~1. The tread depth shall be 20 inches (508 mm) minus four-thirds of the riser height.~~

~~2. The riser height shall be 15 inches (381 mm) minus three-fourths of the tread depth.~~

~~**AQ104.2.1.4 Landing platforms.** The top tread and riser of stairways accessing *lofts* shall be constructed as a *landing platform* where the *loft* ceiling height is less than 6 feet 2 inches (1880 mm) where the stairway meets the *loft*. The *landing platform* shall be 18 inches to 22 inches (457 to 559 mm) in depth measured from the nosing of the landing platform to the edge of the *loft*, and 16 to 18 inches (406 to 457 mm) in height measured from the *landing platform* to the *loft* floor.~~

~~**AQ104.2.1.5 Handrails.** Handrails shall comply with Section R311.7.8.~~

~~**AQ104.2.1.6 Stairway guards.** Guards at open sides of stairways shall comply with Section R312.1.~~

~~**AQ104.2.2 Ladders.** Ladders accessing *lofts* shall comply with Sections AQ104.2.1 and AQ104.2.2.~~

~~**AQ104.2.2.1 Size and capacity.** Ladders accessing *lofts* shall have a rung width of not less than 12 inches (305 mm), and 10-inch (254 mm) to 14-inch (356 mm) spacing between rungs. Ladders shall be capable of supporting a 200-pound (75 kg) load on any rung. Rung spacing shall be uniform within $^{3}/_{8}$ inch (9.5 mm).~~

~~**AQ104.2.2.2 Incline.** Ladders shall be installed at 70 to 80 degrees from horizontal.~~

~~**AQ104.2.3 Alternating tread devices.** Alternating tread devices accessing *lofts* shall comply with Sections R311.7.11.1 and R311.7.11.2. The clear width at and below the handrails shall be not less than 20 inches (508 mm).~~

~~**AQ104.2.4 Ship's ladders.** Ship's ladders accessing *lofts* shall comply with Sections R311.7.12.1 and R311.7.12.2. The clear width at and below handrails shall be not less than 20 inches (508 mm).~~

~~**AQ104.2.5 Loft Guards.** *Loft* guards shall be located along the open side of *lofts*. *Loft* guards shall be not less than 36 inches (914 mm) in height or one-half of the clear height to the ceiling, whichever is less.~~))

AQ104.1 Air leakage testing. The air leakage rate for tiny houses shall not exceed 0.30 cfm at 50 Pascals of pressure per feet of the dwelling unit enclosure area. Testing shall be conducted in accordance with RESNET/ICC 380, ASTM E 779 or ASTM E 1827 and reported at a pressure of 0.2 inch w.g. (50 Pascals). Where required by the code official, testing shall be conducted by an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official. Testing shall be performed after the continuous air barrier, including all penetrations, is completed and sealed.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weather stripping or other infiltration control measures.
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures.
3. Interior doors, if installed at the time of the test, shall be open.
4. Exterior louvers for continuous ventilation systems and heat recovery ventilators shall be closed and sealed.
5. Heating and cooling systems, if installed at the time of the test, shall be turned off.
6. Supply and return registers, if installed at the time of the test, shall be fully open.

[W] AQ104.1.1 Whole house mechanical ventilation. Where an air leakage rate not exceeding 0.30 cfm per ft of the dwelling unit enclosure area in accordance with Section AQ106.1 is provided, the tiny house shall be provided with whole house mechanical ventilation in accordance with Section M1505.4.

[W] ((~~SECTION AQ105~~
~~EMERGENCY ESCAPE AND RESCUE OPENINGS~~

~~**AQ105.1 General.** *Tiny houses* shall meet the requirements of Section R310 for emergency escape and rescue openings.~~

~~**Exception:** *Egress roof access windows* in *lofts* used as sleeping rooms shall be deemed to meet the requirements of Section R310 where installed such that the bottom of the opening is not more than 44 inches (1118 mm) above the *loft* floor, provided the egress roof access window complies with the minimum opening area requirements of Section R310.2.1.~~))

APPENDICES R and S

Note: Appendices R and S are not adopted by The City of Seattle.

APPENDIX T [RE]

[W] SOLAR-READY PROVISIONS— DETACHED ONE- AND TWO-FAMILY DWELLINGS, ((~~AND~~)) MULTIPLE SINGLE-FAMILY DWELLINGS (TOWNHOUSES)

[W] ((~~*The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.*~~))

User note:

About this appendix: *Harnessing the heat or radiation from the sun's rays is a method to reduce the energy consumption of a building. Although Appendix T does not require solar systems to be installed for a building, it does require the space(s) for installing such systems, providing pathways for connections and requiring adequate structural capacity of roof systems to support solar systems.*

Section numbers in parenthesis are those in Appendix A of the residential provisions of the International Energy Conservation Code®.

SECTION T101
SCOPE

[S] T101.1 (RA101.1) General. ((~~These provisions shall be applicable for new construction where solar-ready provisions are required.~~)) New one- and two-family dwellings shall be provided with a *solar-ready zone* of not less than 300 square feet. Townhouses shall be provided with a *solar-ready zone* of not less than 150 square feet for each dwelling unit.

Exception: The following do not require *solar-ready zones:*

1. One- and two-family dwellings with less than 600 square feet of qualifying roof area conforming to the requirements of Section T101.1.1.
2. Individual units within townhouse buildings that have less than 300 square feet of qualifying roof area per unit conforming to the requirements of Section T101.1.1.
3. Buildings with permanently installed on-site renewable energy systems.

[S] T101.1.1 General. Qualifying roof area includes all roof areas other than the following:

1. Roof areas oriented within 45 degrees of true north and having slopes greater than 2:12.
2. Roof areas shaded by existing landforms, structures or trees for more than 70 percent of daylight hours annually. Shading from future tree growth need not be considered.
3. Roof areas consisting of skylights, occupied decks, or planted areas.
4. Access or set-back areas required by this code or the applicable provisions of the *International Fire Code.*

SECTION T102 (RA102)
GENERAL DEFINITION

T102.1 General. The following term shall, for the purpose of this appendix, have the meaning shown herein.

SOLAR-READY ZONE. A section or sections of the roof or building overhang designated and reserved for the future installation of a solar photovoltaic panel. ((~~or solar thermal system.~~))

SECTION T103 (RA103)
SOLAR-READY ZONE

[S] T103.1 General. ((~~New detached one- and two-family dwellings, and townhouses with not less than 600 square feet (55.74 m²) of roof area oriented between 90 degrees and 270 degrees of true north, shall comply with Sections T103.2 through T103.10.~~)) The solar-ready zone shall comply with Sections T103.1.1 through T103.1.3.

((~~**Exceptions:**~~

1. ~~New residential buildings with a permanently installed on-site renewable energy system.~~
2. ~~A building where all areas of the roof that would otherwise meet the requirements of Section T103 are in full or partial shade for more than 70 percent of daylight hours annually.~~

APPENDIX T

~~**T103.2 (RA103.2) Construction document requirements for solar-ready zone.** Construction documents shall indicate the solar-ready zone.~~))

[S] ((~~T103.3~~)) T103.1.1 (RA103.3) Solar-ready zone area. The ((~~total~~)) *solar-ready zone* ((~~area shall be not less than 300 square feet (27.87 m²) exclusive of mandatory access or setback areas as required by the *International Fire Code*~~)) may be comprised of one single area or of multiple separated areas. ((~~New townhouses three stories or less in height above grade plane and with a total floor area less than or equal to 2,000 square feet (185.8 m²) per dwelling shall have a solar-ready zone area of not less than 150 square feet (13.94 m²). The solar-ready zone shall be composed of areas not less than 5 feet (1524 mm) in width and not less than 80 square feet (7.44 m²) exclusive of access or set-back areas as required by the *International Fire Code*.~~)) No solar-ready zone shall be less than 5 feet in any dimension nor less than 80 square feet of contiguous area.

[S] ((~~T103.4~~)) T103.1.2 (RA103.4) Obstructions and shadows. ((~~Solar ready zones~~)) The *solar-ready zone* shall be free from obstructions, including but not limited to vents, chimneys, and roof-mounted equipment. Permanently installed objects adjacent to the *solar-ready zone* shall be located so that they do not cast shadows on the *solar-ready zone* when the sun is directly east, west, or south of the *solar-ready zone* at 45 degrees above the horizon. Such objects include but are not limited to taller portions of the building, parapets, chimneys, antennas, rooftop *equipment*, trees, and roof plantings. Shading from future tree growth need not be considered.

[S] T103.1.3 Structural support. The supporting structure of the solar-ready zone shall be designed in accordance with Section R324.4, using a minimum of 4 pounds per square foot as an assumed photovoltaic panel weight.

[S] ((~~T103.5 Shading.~~ ~~The solar-ready zone shall be set back from any existing or new, permanently affixed object on the building or site that is located south, east or west of the solar zone a distance not less than two times the object's height above the nearest point on the roof surface. Such objects include, but are not limited to, taller portions of the building itself, parapets, chimneys, antennas, signage, rooftop equipment, trees and roof plantings.~~))

[S] ((~~T103.6 Capped roof penetration sleeve.~~ ~~A capped roof penetration sleeve shall be provided adjacent to a solar-ready zone located on a roof slope of not greater than 1 unit vertical in 12 units horizontal (8 percent slope). The capped roof penetration sleeve shall be sized to accommodate the future photovoltaic system conduit, but shall have an inside diameter of not less than 1-1/4 inches (32 mm).~~))

[S] ((~~T103.7 (RA103.5) Roof load documentation.~~ ~~The structural design loads for roof dead load and roof live load shall be clearly indicated on the construction documents.~~

~~**T103.8 (RA103.6) Interconnection pathway.** Construction documents shall indicate pathways for routing of conduit or plumbing from the solar-ready zone to the electrical service panel or service hot water system.~~))

[S] ((~~T103.9~~)) T103.2 (RA103.7) Electrical service reserved space. The main electrical service panel shall have a reserved space to allow installation of a dual pole circuit breaker for future solar electric installation and shall be labeled "For Future Solar Electric." ((~~The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.~~))

[S] ((~~T103.10~~)) T103.3 (RA103.8) ((~~Construction documentation certificate.~~)) Posted certificate. A permanent certificate, indicating the boundaries and structural provisions of the *solar-ready zone*, ((~~and other requirements of this section,~~)) shall be posted near the electrical distribution panel, water heater or other conspicuous location. ((~~by the builder or registered design professional.~~))

[S] T103.4 Construction documents. *Construction documents* shall indicate the boundaries and the assumed photovoltaic panel weight used for design in Section T103.1.3 for the *solar-ready zone*.

SUMMARY and FISCAL NOTE*

Department:	Dept. Contact/Phone:	CBO Contact/Phone:
SDCI	Micah Chappell 206-305-4362	Christie Parker 206-684-5211

** Note that the Summary and Fiscal Note describes the version of the bill or resolution as introduced; final legislation including amendments may not be fully described.*

1. BILL SUMMARY

Legislation Title: AN ORDINANCE relating to Seattle's construction codes; adopting the Seattle Boiler Code, Building Code, Electrical Code, Existing Building Code, Fuel Gas Code, Mechanical Code, Plumbing Code, and Residential Code by reference, amending certain chapters of those codes, and adopting new chapters for those codes; correcting references to those codes in the Seattle Municipal Code; making technical corrections; adding a new Chapter 22.101 to the Seattle Municipal Code; amending the title of Subtitle I of Title 22, Sections 5.73.020, 6.410.070, 6.420.030, 22.170.010, 22.170.050, 22.206.090, 22.206.130, 22.206.160, 22.208.020, 22.502.016, 22.801.030, 25.09.100, 25.09.110, 25.09.120, 25.09.220, and 25.09.520 of the Seattle Municipal Code; repealing Chapters 22.100 and 22.110 and Subtitles IA, III, IV, IVA, and IVB of Title 22 of the Seattle Municipal Code; and repealing ordinances or sections of the following ordinances that adopted or amended older editions of construction codes: 117723, 118654, 119478, 121865, 125156, 125157, 125158, 125160, 125161, 125162, 125337, 125408, 125409, 125410, and 125588.

Summary and background of the Legislation:
This legislation adopts the 2018 Seattle Construction Codes, which consists of Codes from the International Code Council (ICC), National Fire Protection Association (NFPA), and International Association of Plumbing and Mechanical Officials (IAPMO), with Seattle amendments. These codes are adopted by the State, and State law allows local jurisdictions to amend certain codes and requires local jurisdictions to enforce them. The Boiler Code is an exception; Seattle is one of a few jurisdictions in Washington that has its own Boiler Code.

The Seattle Construction Codes – Building, Residential, Existing Building, Mechanical, Fire, Plumbing, Energy, Electrical, Fuel Gas, Boiler, and Elevator – are a vital component of providing a safe, healthy, livable community. Every three years, as changes occur at the national and state levels, our local codes are also refined to meet or exceed those standards. This legislation is the final step to adopt and implement the 2018 Seattle Codes.

Seattle is required by law to adopt the State Code but is allowed to develop and adopt further amendments for certain codes. Per WAC 51-50-008, the 2018 State Codes go into effect February 1, 2021, regardless of when Seattle adopts (by ordinance) our updated Codes and amendments; however, the City does not enforce the updated codes until they are adopted by ordinance.

A list of the most significant Seattle Construction Code amendments follows Section 4 of this document. In addition to those amendments, this ordinance makes several overdue technical amendments, primarily in two areas:

1) Consolidating several subtitles of Seattle Municipal Code (SMC) Title 22 – subtitles that used to hold more than a simple adoption of another code – into a table and amends or repeals SMC sections affected by the consolidation; and

2) Updating SMC cross-references to the Seattle Construction Codes that have changed due to Construction Codes' renumbering or moving of content – this has never been done simultaneously with the Construction Codes' adoption, so many cross-references have been incorrect for several years.

2. CAPITAL IMPROVEMENT PROGRAM

Does this legislation create, fund, or amend a CIP Project? ___ **Yes** _X_ **No**

3. SUMMARY OF FINANCIAL IMPLICATIONS

Does this legislation amend the Adopted Budget? ___ **Yes** _X_ **No**

Does the legislation have other financial impacts to The City of Seattle that are not reflected in the above, including direct or indirect, short-term or long-term costs?
No other fiscal impacts to the City.

Is there financial cost or other impacts of *not* implementing the legislation?
Chapter 19.27 RCW requires the City to implement this legislation.

4. OTHER IMPLICATIONS

a. Does this legislation affect any departments besides the originating department?
This legislation will require all departments that will build or renovate buildings in the city of Seattle to comply with the 2018 codes.

b. Is a public hearing required for this legislation?
No, a public hearing is not required for this legislation.

c. Is publication of notice with *The Daily Journal of Commerce* and/or *The Seattle Times* required for this legislation?
No, a publication of notice is not required for this legislation.

d. Does this legislation affect a piece of property?
The legislation will affect construction, alteration and demolition of structures on any property but is not directed at any specific property.

e. Please describe any perceived implication for the principles of the Race and Social Justice Initiative. Does this legislation impact vulnerable or historically disadvantaged communities? What is the Language Access plan for any communications to the public?
No impact on vulnerable or historically disadvantaged communities is anticipated.

f. Climate Change Implications

1. **Emissions: Is this legislation likely to increase or decrease carbon emissions in a material way?**
   This legislation will decrease carbon emissions by allowing mass timber materials, in the newly created classifications of Type IV construction, to be utilized in structures up to eighteen stories in height.

2. **Resiliency: Will the action(s) proposed by this legislation increase or decrease Seattle's resiliency (or ability to adapt) to climate change in a material way? If so, explain. If it is likely to decrease resiliency in a material way, describe what will or could be done to mitigate the effects.**
   This legislation will increase Seattle's resiliency through the increased seismic design standards and the requirement to incorporate new tsunami design criteria for certain structures within an identified tsunami inundation zone.

g. If this legislation includes a new initiative or a major programmatic expansion: What are the specific long-term and measurable goal(s) of the program? How will this legislation help achieve the program's desired goal(s).
This legislation does not include any new initiatives or major expansion of any program.

List attachments/exhibits below:
Summary Attachment A – Code Reviser's Statement on RCW 35.21.180

A list of significant changes in the 2018 codes begins on the next page of this document.

Seattle is proposing to adopt a suite of construction codes that include National, State, and Seattle amendments. The following summary outlines the significant changes that will be included in the 2018 Seattle Codes:

2018 Seattle Building Code

Mass Timber

Since July 2019, Seattle has allowed use of the WA State-adopted standards for Mass Timber. In the 2018 SBC, Seattle will formally adopt Mass Timber standards that create three new construction types, Type IV-A, Type IV-B, Type IV-C, and maintains Type IV Heavy Timber (IV-HT).

Efficiency dwelling units

This code change changes the living room/habitable space requirement of an efficiency dwelling unit to 190 square feet of floor area, so it is aligned and consistent with the requirements of a dwelling unit's net floor area.

Gender-neutral toilet facilities

These State changes provide guidance on how these facilities are constructed; where they are provided; specifies that there is no reduction in the number of fixtures required based on separate facility requirements; and requires full height walls surround the toilet fixtures, individual compartments are securable, and that egress from the room cannot be locked, among other items.

High Rise Shaft Pressurization

Submittal and testing requirements for stairway and hoistway pressurization have been enhanced and clarified. A Smoke control conference is required in addition to the high-rise pre-submittal conference. Includes special Inspection requirements by a design professional to verify the entire system operates as designed.

Tsunami Loads

This is a new section in the code for Risk Category III and IV buildings and structures that require their designs to include tsunami loads.

Seismic Loads

These changes incorporate revisions in the ASCE 7-16 seismic design provisions that were adjusted primarily to incorporate recent research related to site amplification models and soil-structure interaction effects. Additionally, ASCE 7-16 adopted new seismic ground motion values including mapped acceleration parameters and site class coefficients. Furthermore, the new ASCE 7-16 provisions require the engineer to either perform site-specific response analysis or take a penalty to the prescriptive response spectral seismic demand for projects founded on Site Class D in seismically active areas.

Elevator Code (Seattle Building Code Ch.30)

Seattle is adding the entire 2008 WAC 296-96 Part D into our building code that covers retroactive requirements for existing installations. Section 3016 will change a reference to Seismic Design Category D to reflect ASME A17.1, 8.4. Deleting sump pump and drain

requirements for Fire Service Access Elevators & Occupant Evacuation Elevators. Adding a requirement for quarterly testing of Firefighters' Emergency Operation.

2018 Seattle Residential Code

Definitions
Distributed Whole House Ventilation, Dwelling Unit, Egress Roof Access Window, Floor Area, Landing Platform, Sleeping Loft, Townhouse, Townhouse Unit, etc.

Townhouses
Modifies a State amendment on townhouse sprinklers by removing an exception, therefore Seattle will require automatic sprinkler systems in all new townhouses.

Habitable Attic
Identifies that a habitable attic is considered a story, with certain exceptions, but eliminates the possibility of exceeding the allowable scope of the residential code.

Sleeping Loft
Relocates many of the standards of Appendix Q for tiny houses to allow residential dwelling units the option of smaller sleeping spaces. The idea is that this isn't considered habitable space and doesn't require compliance with the livability provisions while providing area limitations allows ceiling heights less than 80 inches, and reduces access and egress requirements to the sleeping loft to provide flexibility while maintaining a safe environment.

Emergency Escape and Rescue Openings
Identifies a maximum height above the finished floor a control device can be located that opens an emergency escape window.

Decks
Updates required deck footing sizes, and material span tables specific to our region.

Tiny House Appendix Q
Appendix Q defines a tiny house and provides for modified energy code testing criteria for these smaller spaces.

2018 Seattle Existing Building Code

Minimal changes
Text was reorganized to mirror National Code structure and unnecessary text was eliminated which will make it easier for code users. Revised sections to allow the use of reduced seismic forces for wall anchorage in unreinforced masonry walls in major alterations.

2020 Seattle Electrical Code

Calculated Electric Load
Modify Article 220.84 to prevent calculated excess service capacity when using advanced heat pump systems.

Electric Vehicle Charging Infrastructure
Modifies Article 220.57 and 625. 27 to align EV charging infrastructure requirements with the Land Use Code.

2018 Seattle Mechanical Code

Smoke filtration
Air handlers and energy recovery ventilators serving occupiable spaces with a capacity greater than 500 cfm will be required to have filter box that can accommodate a minimum MERV 13 filter. This will assist with maintaining the air quality in a building during a forest fire or other adverse event.

Sound attenuators in grease ducts
Allow the of sound attenuators in grease ducts if they meet listing and labeling requirements. This will assist in reducing complaints about noisy restaurant systems.

2018 Seattle Plumbing Code

Air admittance valve
This change identifies the allowable locations and installation requirements for air admittance valves.

Boiler Seattle Boiler Code
Clarifies requirements and exemptions for installation permits and inspections to align with Chapter 70.79 RCW and Chapter 296-104 WAC. Section 6 provides clarifies requirements for pre-approvals, code compliance, notifications, approval, and documentation of repairs and alterations.

Code Reviser's Statement on RCW 35.21.180

RCW 35.21.180 allows cities to adopt by reference "any printed code or compilation," rather than listing the entire code in an ordinance, as long as a physical copy is filed "for use and examination by the public, in the office of the city or town clerk of said city, or town prior to adoption thereof." Given that "printed" has been the word used in this section and its predecessors since 1935, and given that RCW 35.21.530 and its predecessors have referred to municipal codes as requiring a "typewritten or printed copy" since 1957, the most sensible construction is that these state laws expect a physical book version of anything adopted by reference; linking to an electronic version alone would not satisfy these RCW requirements.

Physical book copies of each code listed in this bill as having a corresponding Clerk File will be filed prior to adoption to comply with RCW 35.21.180. However, COVID-19 restrictions on public spaces render it logistically impossible to, while the bill is being considered, make those filed books available "for use and examination by the public." In the interim, links to online versions of codes adopted by reference are below:

- 2018 International Building Code (Attachment B) – https://codes.iccsafe.org/content/IBC2018P4
- 2020 National Electrical Code (Attachment C) – https://www.nfpa.org/NEC/About-the-NEC/Explore-the-2020-NEC
- 2018 International Existing Building Code (Attachment D) – https://codes.iccsafe.org/content/IEBC2018P4
- 2018 International Fuel Gas Code (Attachment E) – https://codes.iccsafe.org/content/IFGC2018P3
- 2018 International Mechanical Code (Attachment F) – https://codes.iccsafe.org/content/IMC2018P3
- 2018 Uniform Plumbing Code, adopted and amended by chapter 51-56 WAC (Attachment G) – http://epubs.iapmo.org/2018/UPC/ and https://apps.leg.wa.gov/wac/default.aspx?cite=51-56
- 2018 International Residential Code (Attachment H) – https://codes.iccsafe.org/content/IRC2018P3

The adopted books should be the same printings linked to above; however, for the five International Codes, initial electronic documents used to create the attachments came from earlier printings supplied to Seattle by the International Code Council. Every effort has been made to update the initial files to current printings' language. In the event of a discrepancy in unamended code language, the filed books will control.

File #: CB 119993, **Version:** 1

CITY OF SEATTLE

ORDINANCE _____

COUNCIL BILL _____

AN ORDINANCE relating to Seattle's construction codes; adopting the Seattle Energy Code and chapters of the Washington Administrative Code by reference and amending certain chapters of the Code; amending Section 22.101.010 of the Seattle Municipal Code; repealing Title 22, Subtitle VII of the Seattle Municipal Code; and repealing Sections 2 through 10 of Ordinance 125159 and Section 5 of Ordinance 125410.

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

ADOPTION OF NEW CODE

Section 1. To the extent listed in Section 22.101.010 of the Seattle Municipal Code as amended by this ordinance, and with a copy on file with the City Clerk in the Clerk File listed in Section 22.101.010, the following code is adopted by reference, with additional amendments to that code in the listed attachment to this ordinance:

Code adopted by reference	Contained/amended in
Chapters 51-11C and 51-11R WAC (Washington State Energy Code)	Attachment A

Section 2. Section 22.101.010 of the Seattle Municipal Code, enacted by the ordinance introduced as Council Bill 119992, is amended as follows:

22.101.010 List of construction codes

Table A for 22.101.010 lists various adopted Seattle editions of construction codes. For each base code that has been adopted by reference, a copy is on file in the Clerk's Office in the listed Clerk File. Each code consists of the listed portions of the base code, any additional chapters listed as adopted by ordinance, and amendments adopted by ordinance.

Table A for 22.101.010
Construction codes adopted by reference

Name	Base code	Additional chapters	Clerk File
Seattle Boiler and Pressure Vessel Code	Attachment A to this ordinance		
Seattle Building Code	2018 International Building Code, Chapters 2 through 29 and 31 through 35	Chapters 1 and 30, in Attachment B to this ordinance	321854
Seattle Electrical Code	2020 National Electrical Code and selected portions of chapter 296-46B WAC	Article 80, in Attachment C to this ordinance	321855
Seattle Energy Code	2018 Washington State Energy Code		321861
Seattle Existing Building Code	2018 International Existing Building Code, Chapters 2 through 11, 13, 15, and 16 and Appendix A	Chapter 1, in Attachment D to this ordinance	321856
Seattle Fuel Gas Code	2018 International Fuel Gas Code, Chapters 2 through 8 and Appendices A through D	Chapter 1, in Attachment E to this ordinance	321857
Seattle Mechanical Code	2018 International Mechanical Code, Chapters 2 through 9 and 11 through 15 and Appendices A and B	Chapter 1, in Attachment F to this ordinance	321858
Seattle Residential Code	2018 International Residential Code, Chapters 2 through 10, 12 through 24, 29, and 44 and Appendices F, Q, and T	Chapter 1, in Attachment H to this ordinance	321860

REPEAL OF OLD CODE AND TRANSITION PROVISIONS

Section 3. The following sections of ordinances, either adopting or amending older editions of the Seattle Energy Code, are repealed: Sections 2 through 10 of Ordinance 125159 and Section 5 of Ordinance 125410.

Section 4. Beginning on the effective date of this ordinance and ending on March 15, 2021, permit applicants who submit a valid and fully complete building permit application during that period may elect to have the application reviewed under the provisions of one or more codes listed in Section 3 of this ordinance rather than the provisions of codes adopted in this ordinance.

SEATTLE MUNICIPAL CODE CLEANUP AND CORRECTIONS

Section 4. Title 22, Subtitle VII of the Seattle Municipal Code, last amended by Ordinance 125159, is repealed:

((~~Subtitle VII Energy Code~~

~~CHAPTER 22.700 ADMINISTRATION~~

~~22.700.010 Seattle Energy Code~~

~~The Seattle Energy Code consists of: 1) The first printing of Chapter 51-11C and the second printing of Chapter 51-11R of the Washington Administrative Code (WAC), effective July 1, 2016, which are adopted by reference; and 2) amendments and additions to Chapters 51-11C and 51-11R of the Washington Administrative Code adopted by the City Council by ordinance. One copy of the first printing of Chapter 51-11C and the second printing of Chapter 51-11R of the Washington Administrative Code, effective July 1, 2016, is filed with the City Clerk in Clerk File 319948.~~))

SEVERABILITY AND EFFECTIVE DATE CLAUSES

Section 5. The provisions of this ordinance are declared to be separate and severable. The invalidity of any clause, sentence, paragraph, subdivision, section, or portion of this ordinance, or the invalidity of its application to any person or circumstance, does not affect the validity of the remainder of this ordinance or the validity of its application to other persons or circumstances.

Section 6. Section 3 of this ordinance shall take effect and be in force on March 15, 2021.

Section 7. This ordinance shall take effect and be in force 30 days after its approval by the Mayor, but if not approved and returned by the Mayor within ten days after presentation, it shall take effect as provided by Seattle Municipal Code Section 1.04.020.

Passed by the City Council the _____ day of _____, 2021, and signed by me in open session in authentication of its passage this _____ day of _____, 2021.

_____

President _____ of the City Council

Approved / returned unsigned / vetoed this _____ day of _____, 2021.

_____

Jenny A. Durkan, Mayor

Filed by me this _____ day of _____, 2021.

_____

Monica Martinez Simmons, City Clerk

(Seal)

Attachments:
Attachment A - Amendments to 2018 Washington State Energy Code

CHAPTER 1 [CE]

SCOPE AND ADMINISTRATION

SECTION C101
SCOPE AND GENERAL REQUIREMENTS

C101.1 Title. This code, consisting of Chapter 1 [CE] through Chapter 6 [CE] and Appendices A through D, shall be known as the ((~~*Washington State Energy Code,*~~)) "Seattle Commercial Energy Code," and shall be cited as such. It is referred to herein as "this code."

C101.2 Scope. This code applies to *commercial buildings* and the buildings sites and associated systems and equipment. References in this code to Group R shall include Group I-1, Condition 2 assisted living facilities licensed by Washington state under chapter 388-78A WAC and Group I-1, Condition 2 residential treatment facilities licensed by Washington state under Chapter 246-337 WAC. Building areas that contain Group R sleeping units, regardless of the number of stories in height, are required to comply with the commercial sections of the energy code.

Exception: The provisions of this code do not apply to *temporary growing structures* used solely for the commercial production of horticultural plants including ornamental plants, flowers, vegetables, and fruits. A temporary growing structure is not considered a building for the purposes of this code. However, the installation of other than listed, portable mechanical equipment or listed, portable lighting fixtures is not allowed.

C101.3 Intent. This code shall regulate the design and construction of buildings for the use and conservation of energy and the reduction of carbon emissions over the life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

C101.4 Applicability. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

C101.4.1 Mixed residential and commercial buildings. Where a building includes both *residential building* and *commercial building* portions, each portion shall be separately considered and meet the applicable provisions of ((~~WSEC~~)) the Seattle Energy Code—Commercial Provisions or ((~~WSEC~~)) the Seattle Energy Code—Residential Provisions.

C101.5 Compliance. *Residential buildings* shall meet the provisions of ((~~WSEC~~)) the Seattle Energy Code—Residential Provisions. *Commercial buildings* shall meet the provisions of ((~~WSEC~~)) the Seattle Energy Code—Commercial Provisions.

C101.5.1 Compliance materials. The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

C101.6 Appendices. Appendices A, B, C and D are included in the adoption of this code. Provisions in appendices E and F shall not apply unless specifically adopted by the local jurisdiction.

SECTION C102
ALTERNATIVE MATERIALS, DESIGN AND METHODS OF CONSTRUCTION AND EQUIPMENT

C102.1 General. The provisions of this code ((~~are not intended to~~)) do not prevent the installation of any material, or ((~~to~~)) prohibit any design or method of construction prohibited by this code or not specifically ((~~prescribed~~)) allowed by this code, provided that any such alternative has been *approved.* An alternative material, design or method of construction shall be *approved* where the *code official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety. The *code official* may approve an alternate material, method of construction, design or insulating system, provided the *code official* finds that the proposed alternate complies with the provisions of this code, and that the alternate, when considered together with other safety features of the building or other relevant circumstances, will provide at least an equivalent level of strength, effectiveness, fire resistance, durability, safety and sanitation. Where the alternative material, design or method of construction is not approved, the *code official* shall respond in writing, stating the reasons why the alternative was not approved.

The *code official* may require that sufficient evidence or proof be submitted to reasonably substantiate any claims regarding the use or suitability of the alternate. The *code official* may, but is not required to, record the approval of modifications and any relevant information in the files of the building official or on the *approved* permit plans.

C102.2 Modifications. The *code official* may modify the requirements of this code for individual cases provided the *code official* finds: (1) there are practical difficulties involved in carrying out the provisions of this code; (2) the modification is in conformity with the intent and purpose of this code; (3) the modification will provide a reasonable level of fire protection and

structural integrity when considered together with other safety features of the building or other relevant circumstances, and (4) the modification maintains or improves the energy efficiency of the building. The *code official* may, but is not required to, record the approval of modifications and any relevant information in the files of the *code official* or on the *approved* permit plans.

SECTION C103
((~~CONSTRUCTION DOCUMENTS~~)) APPLICATIONS AND PERMITS

C103.1 General. A permit for work performed according to this code shall be obtained in accordance with Chapter 1 of the International Building Code, International Mechanical Code or Seattle Electrical Code.

C103.2 Construction documents. Construction documents and other supporting data shall ((~~be submitted in one or more sets with each application for a permit~~)) comply with this section and the International Building Code, International Mechanical Code, International Existing Building Code and Seattle Electrical Code. ((~~The construction documents shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *code official* is authorized to require necessary construction documents to be prepared by a registered design professional.~~

~~**Exception:** The *code official* is authorized to waive the requirements for construction documents or other supporting data if the *code official* determines they are not necessary to confirm compliance with this code.~~))

C103.2.1 Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, as applicable:

1. Insulation materials and their *R*-values.
2. Fenestration *U*-factors and SHGCs.
3. Area-weighted *U*-factor and SHGC calculations.
4. Mechanical system design criteria.
5. Mechanical and service water heating system and equipment types, sizes and efficiencies.
6. Economizer description.
7. Equipment and systems controls.
8. Fan motor horsepower (hp) and controls.
9. Duct sealing, duct and pipe insulation and location.
10. Lighting fixture schedule with wattage and control narrative.
11. Location of daylight zones on floor plan.
12. Air barrier details including all air barrier boundaries and associated square foot calculations on all six sides of the air barrier as applicable.

((~~**C103.2.1**~~)) **C103.2.2 Building thermal envelope depiction.** The building's thermal envelope shall be represented on the construction documents.

((~~**C103.3 Examination of documents.** The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances.~~

~~**C103.3.1 Approval of construction documents.** When the *code official* issues a permit where construction documents are required, the construction documents shall be endorsed in writing and stamped "Reviewed for Code Compliance." Such *approved* construction documents shall not be changed, modified or altered without authorization from the *code official*. Work shall be done in accordance with the *approved* construction documents.~~))

C103.2.3 Document retention. One set of construction documents so reviewed shall be retained by the *code official*. The other set shall be returned to the applicant, kept at the site of work and shall be open to inspection by the *code official* or a duly authorized representative.

((~~**C103.3.2 Previous approvals.** This code shall not require changes in the construction documents, construction or designated occupancy of a structure for which a lawful permit has been heretofore issued or otherwise lawfully authorized, and the construction of which has been pursued in good faith within 180 days after the effective date of this code and has not been abandoned.~~

~~**C103.3.3 Phased approval.** The *code official* shall have the authority to issue a permit for the construction of part of an energy conservation system before the construction documents for the entire system have been submitted or *approved*, pro-~~

~~vided adequate information and detailed statements have been filed complying with all pertinent requirements of this code. The holders of such permit shall proceed at their own risk without assurance that the permit for the entire energy conservation system will be granted.~~))

((~~**C103.4 Amended construction documents.** Changes made during construction that are not in compliance with the *approved* construction documents shall be resubmitted for approval as an amended set of construction documents.~~))

((~~**C103.5 Retention of construction documents.** One set of *approved* construction documents shall be retained by the *code official* for a period of not less than 180 days from date of completion of the permitted work, or as required by state or local laws.~~))

C103.6 Building documentation and close out submittal requirements. The construction documents shall specify that the documents described in this section be provided to the building owner or owner's authorized agent within a maximum of 90 days of the date of receipt of the certificate of occupancy.

C103.6.1 Record documents. Construction documents shall be updated by the installing contractor and architect or engineer of record to convey a record of the completed work. Such updates shall include building envelope, mechanical, plumbing, electrical and control drawings red-lined, or redrawn, ((~~if specified,~~)) that show all changes to size, type and locations of components, equipment and assemblies. Record documents shall include the location and model number of each piece of equipment as installed. The architect, engineer of record or installing contractor is required to provide consolidated record drawings in compliance with this section to the building owner or owner's authorized agent with the timeline specified in Section C103.6.

C103.6.2 Building operations and maintenance information. Required regular maintenance actions for equipment and systems shall be clearly stated on a readily visible label on the equipment. The label shall include the title or publication number for the operation and maintenance manual for that particular model and type of product and the manufacture date or installation date.

C103.6.2.1 Manuals. An operating and maintenance manual shall be provided for each component, device, piece of equipment, and system governed by this code. The manual shall include all of the following:

1. Submittal data indicating all selected options for each piece of equipment and control device.
2. Manufacturer's operation manuals and maintenance manuals for each device, piece of equipment, and system requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions, cleaning and recommended relamping shall be clearly identified.
3. Name and address of at least one service agency.
4. Controls system inspection schedule, maintenance and calibration information, wiring diagrams, schematics, and control sequence descriptions. A schedule for inspecting and recalibrating all lighting controls. Desired or field-determined set points shall be PERMANENTLY recorded on control drawings at control devices or, for digital control systems, on the graphic where settings may be changed.
5. A narrative of how each system is intended to operate, including recommended set points. Sequence of operation alone is not acceptable for this requirement.

C103.6.3 Compliance documentation. All energy code compliance forms and calculations shall be delivered in one document to the building owner as part of the project record documents or manuals, or as a standalone document. This document shall include the specific energy code year utilized for compliance determination for each system, NFRC certificates for the installed windows, list of total area for each NFRC certificate, and the interior lighting power compliance path (building area, space-by-space) used to calculate the lighting power allowance.

For projects complying with Section C401.2 item 1, the documentation shall include:

1. The envelope insulation compliance path (prescriptive or component performance).
2. All required completed code compliance forms, and all required compliance calculations. ((~~including, but not limited to, those required by sections C402.1.5, C403.2.12.1, C405.4, and C405.5.~~))

For projects complying with ((~~C401.2~~)) Section C402.2, item 2, the documentation shall include:

1. A list of all proposed envelope component types, areas and *U*-values.
2. A list of all lighting area types with areas, lighting power allowance, and installed lighting power density.
3. A list of each HVAC system modeled with the assigned and proposed system type.
4. Electronic copies of the baseline and proposed model input and output file. The input files shall be in a format suitable for rerunning the model and shall not consist solely of formatted reports of the inputs.

C103.6.4 Systems operation training. Training of the maintenance staff for equipment included in the manuals required by Section C103.6.2 shall include at a minimum:

1. Review of manuals and permanent certificate.

2. Hands-on demonstration of all normal maintenance procedures, normal operating modes, and all emergency shutdown and start-up procedures.
3. Training completion report.

SECTION C104
INSPECTIONS

C104.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official*, his or her designated agent, or an approved agency in accordance with this section and the International Building Code, International Mechanical Code and Seattle Electrical Code, and such construction or work shall remain visible and able to be accessed for inspection purposes until *approved*. Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid. It shall be the duty of the permit applicant to cause the work to remain visible and able to be accessed for inspection purposes. Neither the *code official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.

C104.2 Required inspections. The *code official*, his or her designated agent, or an approved agency, upon notification, shall make the inspections set forth in Sections C104.2.1 through C104.2.6.

C104.2.1 Footing and foundation insulation. Inspections shall verify footing and/or foundation insulation *R*-value, location, thickness, depth of burial and protection of insulation as required by the code, *approved* plans and specifications.

C104.2.2 Thermal envelope. Inspections shall be made before application of interior finish and shall verify that envelope components with the correct type of insulation, the R-values, the correct location of insulation, the correct fenestration, the U-factor, SHGC, VT, and air leakage controls are properly installed as required by the code, approved plans and specifications, including envelope components in future tenant spaces of multi-tenant buildings.

C104.2.3 Plumbing system. Inspections shall verify the type of insulation, the R-values, the protection required, controls, and heat traps as required by the code, approved plans and specifications.

C104.2.4 Mechanical system. Inspections shall verify the installed HVAC equipment for the correct type and size, controls, duct and piping insulation *R*-values, duct system and damper air leakage, minimum fan efficiency, energy recovery and economizer as required by the code, approved plans and specifications.

C104.2.5 Electrical system. Inspections shall verify lighting system controls, components, meters; motors and installation of an electric meter for each dwelling unit as required by the code, approved plans and specifications.

C104.2.6 Final inspection. The final inspection shall include verification of the installation and proper operation of all required building controls, and documentation verifying activities associated with required building commissioning have been conducted in accordance with Section C408.

C104.3 Reinspection. A building shall be reinspected when determined necessary by the *code official*.

C104.4 Approved inspection agencies. The *code official* is authorized to accept reports of *approved* inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability relevant to the building components and systems they are inspecting.

C104.5 Inspection requests. It shall be the duty of the holder of the permit or their duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

C104.6 Reinspection and testing. Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.

((~~C104.7 Approval.~~ ~~After the prescribed tests and inspections indicate that the work complies in all respects with this code, a notice of approval shall be issued by the *code official*.~~

~~**C104.7.1 Revocation.** The *code official* is authorized to, in writing, suspend or revoke a notice of approval issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.~~))

SECTION C105
VALIDITY

C105.1 General. If a portion of this code is held to be illegal or void, such a decision shall not affect the validity of the remainder of this code.

SECTION C106
REFERENCED STANDARDS

C106.1 Referenced codes and standards. The codes and standards referenced in this code shall be those listed in Chapter ((~~5~~)) 6, and such codes and standards shall be considered as part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections C106.1.1 and C106.1.2.

((~~**C106.1.1 Conflicts.** Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.~~))

C106.1.1 References to other codes. Whenever an International, National or Uniform Code is referenced in this code, it means the Seattle edition of that code, which includes local amendments. References to the "Building Code," "Residential Code," "Fire Code," "Electrical Code," "Mechanical Code" and "Plumbing Code" mean the Seattle editions of those codes.

C106.1.2 Provisions in referenced codes and standards. Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.

C106.2 Application of references. References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section or provision of this code.

C106.3 Other laws. The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law. ((~~In addition to the requirements of this code, all occupancies shall conform to the provisions included in the State Building Code (chapter 19.27 RCW). In case of conflicts among the codes enumerated in RCW 19.27.031 (1) through (4) and this code, an earlier named code shall govern over those following.~~)) In the case of conflict between the duct sealing and insulation requirements of this code and the ((~~duct insulation~~)) requirements of Sections 603 and 604 of the *International Mechanical Code*, the ((~~duct insulation~~)) requirements of this code ((~~, or where applicable, a local jurisdiction's energy code~~)) shall govern.

SECTION C107
FEES

C107.1 Fees. ((~~A permit shall not be issued until the fees prescribed in Section C107.2 have been paid, nor shall an amendment to a permit be released until the additional fee, if any, has been paid.~~)) A fee for each permit and for other activities related to the enforcement of this code shall be paid as set forth in the Fee Subtitle, Seattle Municipal Code Title 22, Subtitle IX.

((~~**C107.2 Schedule of permit fees.** A fee for each permit shall be paid as required, in accordance with the schedule as established by the applicable governing authority.~~

~~**C107.3 Work commencing before permit issuance.** Any person who commences any work before obtaining the necessary permits shall be subject to an additional fee established by the *code official*, which shall be in addition to the required permit fees.~~

~~**C107.4 Related fees.** The payment of the fee for the construction, *alteration*, removal or demolition of work done in connection to or concurrently with the work or activity authorized by a permit shall not relieve the applicant or holder of the permit from the payment of other fees that are prescribed by law.~~

~~**C107.5 Refunds.** The *code official* is authorized to establish a refund policy.~~))

SECTION C108
((~~STOP WORK ORDER~~)) ENFORCEMENT

C108.1 Authority. ((~~Whenever the *code official* finds any work regulated by this code being performed in a manner either contrary to the provisions of this code or dangerous or unsafe, the *code official* is authorized to issue a stop work order.~~)) The *code official* is authorized to enforce this code in accordance with the International Building Code, International Mechanical Code and Seattle Electrical Code.

((~~**C108.2 Issuance.** The stop work order shall be in writing and shall be given to the owner of the property involved, the owner's authorized agent, or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order, and the conditions under which the cited work will be permitted to resume.~~

~~**C108.3 Emergencies.** Where an emergency exists, the *code official* shall not be required to give a written notice prior to stopping the work.~~

~~**C108.4 Failure to comply.** Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine as set by the applicable governing authority.~~))

SECTION C109
((~~BOARD OF APPEALS~~)) ADMINISTRATIVE REVIEW

((~~**C109.1 General.** In order to hear and decide appeals of orders, decisions or determinations made by the *code official* relative to the application and interpretation of this code, there shall be and is hereby created a board of appeals. The *code official* shall be an ex-officio member of said board but shall have no vote on any matter before the board. The board of appeals shall be appointed by the governing body and shall hold office at its pleasure. The board shall adopt rules of procedure for conducting its business, and shall render all decisions and findings in writing to the appellant with a duplicate copy to the *code official*.~~))

~~**C109.2 Limitations on authority.** An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply or an equally good or better form of construction is proposed. The board shall have no authority to waive requirements of this code.~~

~~**C109.3 Qualifications.** The board of appeals shall consist of members who are qualified by experience and training and are not employees of the jurisdiction.~~))

C109.1 Administrative review by the code official. Prior to issuance of the building permit, applicants may request administrative review by the *code official* of decisions or actions pertaining to the administration and enforcement of this code. Requests shall be addressed to the *code official.*

C109.2 Administrative review by the Construction Codes Advisory Board. After administrative review and review by the *code official*, and prior to issuance of the building permit, applicants may request review by the Construction Codes Advisory Board of decisions or actions pertaining to the application and interpretation of this code. The review will be performed by a panel of three or more members of the Construction Codes Advisory Board, chosen by the Board Chair. The Chair shall consider the subject of the review and members' expertise when selecting members to conduct a review. The decision of the review panel is advisory only; the final decision is made by the *code official.*

SECTION C110
VIOLATIONS

It shall be unlawful for any person, firm, or corporation to erect or construct any building, or remodel or rehabilitate any existing building or structure in the state, or allow the same to be done, contrary to or in violation of any of the provisions of this code. Violations shall be administered according to the procedures set forth in Section 103 of the International Building Code.

SECTION C111
LIABILITY

Nothing contained in this code is intended to be nor shall be construed to create or form the basis for any liability on the part of any city or county or its officers, employees or agents for any injury or damage resulting from the failure of a building to conform to the provisions of this code, or by reason of any action or inaction on the part of the City related in any manner to the enforcement of this code by its officers, employees or agents.

CHAPTER 2 [CE]

DEFINITIONS

SECTION C201
GENERAL

C201.1 Scope. Unless stated otherwise, the following words and terms in this code shall have the meanings indicated in this chapter.

C201.2 Interchangeability. Words used in the present tense include the future; words in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural includes the singular.

C201.3 Terms defined in other codes. Terms that are not defined in this code but are defined in the *International Building Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, Uniform Plumbing Code* or the *International Residential Code* shall have the meanings ascribed to them in those codes.

C201.4 Terms not defined. Terms not defined by this chapter shall have ordinarily accepted meanings such as the context implies.

SECTION C202
GENERAL DEFINITIONS

ACCESS (TO). That which enables a device, appliance or equipment to be reached by ready access or by a means that first requires the removal or movement of a panel or similar obstruction.

ADDITION. An extension or increase in the *conditioned space* floor area, number of stories, or height of a building or structure.

AFFORDABLE HOUSING. Affordable housing for the purposes of this code shall include buildings which: (a) receive or have received public funding or an allocation of federal low-income housing tax credits; and (b) are subject to a regulatory agreement, covenant, or other legal instrument recorded on the property title, and enforceable by The City of Seattle, Washington State Housing Finance Commission, State of Washington, King County, U.S. Department of Housing and Urban Development, or other similar entity as *approved* by the Seattle Director of Housing, that either:

1. Restricts at least 40 percent of the units to occupancy by households earning no greater than 60 percent of median income, and controls the rents that may be charged, for a minimum period of 40 years; or
2. Restricts initial and subsequent sales of at least 40 percent of the residential units to households with incomes no greater than 80 percent of median income, for a minimum period of 50 years. The sale price for sales subsequent to the initial sale shall be calculated to allow modest growth in homeowner equity while maintaining long-term affordability for future buyers.

AIR BARRIER. One or more materials joined together in a continuous manner to restrict or prevent the passage of air through the building thermal envelope and its assemblies.

AIR CURTAIN. A device, installed at the building entrance, that generates and discharges a laminar air stream intended to prevent the infiltration of external, unconditioned air into the conditioned spaces, or the loss of interior, conditioned air to the outside.

ALTERATION. Any construction, retrofit or renovation to an existing structure other than repair or addition. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation.

APPROVED. Acceptable to the *code official.*

APPROVED AGENCY. An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, or furnishing product certification research reports, where such agency has been *approved* by the *code official.*

ATTIC AND OTHER ROOFS. ((~~All other roofs~~)) Roofs other than roofs with insulation entirely above deck and metal building roofs, including roofs with insulation entirely below (inside of) the roof structure (i.e., attics, cathedral ceilings, and single-rafter ceilings), roofs with insulation both above and below the roof structure, and roofs without insulation. ((~~but excluding roofs with insulation entirely above deck and metal building roofs.~~))

AUTOMATIC. Self-acting, operating by its own mechanism when actuated by some impersonal influence, as, for example, a change in current strength, pressure, temperature or mechanical configuration (see "Manual").

AUTOMATIC CONTROL DEVICE. A device capable of automatically turning loads off and on without manual intervention.

BELOW-GRADE WALL. That portion of a wall in the building envelope that is entirely below the finish grade and in contact with the ground.

BLOCK. A generic concept used in energy simulation. It can include one or more thermal zones. It represents a whole building or portion of a building with the same use type served by the same HVAC system type.

BOILER, MODULATING. A boiler that is capable of more than a single firing rate in response to a varying temperature or heating load.

BOILER SYSTEM. One or more boilers, their piping and controls that work together to supply steam or hot water to heat output devices remote from the boiler.

BUBBLE POINT. The refrigerant liquid saturation temperature at a specified pressure.

BUILDING. Any structure used or intended for supporting or sheltering any use or occupancy, including any mechanical systems, service water heating systems and electric power and lighting systems located on the building site and supporting the building.

BUILDING COMMISSIONING. A process that verifies and documents that the building systems have been installed, and function according to the approved construction documents.

BUILDING ENTRANCE. Any doorway, set of doors, revolving door, vestibule, or other form of portal (including elevator doors such as in parking garages) that is ordinarily used to gain access to the building or to exit from the building by its users and occupants. This does not include doors solely used to directly enter mechanical, electrical, and other building utility service equipment rooms, or doors for emergency egress only. Where buildings have separate one-way doors to enter and leave, this also includes any doors ordinarily used to leave the building.

BUILDING SITE. A contiguous area of land that is under the ownership or control of one entity.

BUILDING THERMAL ENVELOPE. The below-grade walls, above-grade walls, floors, ceilings, roofs, and any other building element assemblies that enclose *conditioned space* or provides a boundary between *conditioned space, semiheated space* and exempt or unconditioned space.

***C*-FACTOR (THERMAL CONDUCTANCE).** The coefficient of heat transmission (surface to surface) through a building component or assembly, equal to the time rate of heat flow per unit area and the unit temperature difference between the warm side and cold side surfaces (Btu/h ft^2 x °F) [W/(m^2 x K)].

CAPTIVE KEY DEVICE. A lighting control that will not release the key that activates the override when the lighting is on.

CAVITY INSULATION. Insulating material located between framing members.

CERTIFIED COMMISSIONING PROFESSIONAL. An individual who is certified by an ANSI/ISO/IEC 17024:2012 accredited organization to lead, plan, coordinate, and manage commissioning teams and implement the commissioning process.

CHANGE OF OCCUPANCY. A change in the use of a building or a portion of a building that results in any of the following:

1. A *change of occupancy* classification.
2. A change from one group to another group within an occupancy classification.
3. Any change in use within a group for which there is a change in the application of the requirements of this code.

CIRCULATING HOT WATER SYSTEM. A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to the fixture supply and back to the water-heating equipment.

CLERESTORY FENESTRATION. See "Fenestration."

CLIMATE ZONE. A geographical region based on climatic criteria as specified in this code.

CODE OFFICIAL. The ((~~officer or other designated authority~~)) Director of the Seattle Department of Construction and Inspections charged with the administration and enforcement of this code, or a duly authorized representative.

COEFFICIENT OF PERFORMANCE (COP) – COOLING. The ratio of the rate of heat removal to the rate of energy input, in consistent units, for a complete refrigerating system or some specific portion of that system under designated operating conditions.

COEFFICIENT OF PERFORMANCE (COP) – HEATING. The ratio of the rate of heat removal to the rate of heat delivered to the rate of energy input, in consistent units, for a complete heat pump system, including the compressor and, if applicable, auxiliary heat, under designated operating conditions.

COMMERCIAL BUILDING. For this code, all buildings not included in the definition of "Residential buildings."

COMPUTER ROOM. A room whose primary function is to house equipment for the processing and storage of electronic data and that has a design *total information technology equipment (ITE)* equipment load less than or equal to 20 watts per square foot of conditioned floor area (215 watts/m^2) or a design *ITE* equipment load less than or equal to 10 kW. See also "Data center."

CONDENSING UNIT. A factory-made assembly of refrigeration components designed to compress and liquefy a specific refrigerant. The unit consists of one or more refrigerant compressors, refrigerant condensers (air-cooled, evaporatively cooled, or water-cooled), condenser fans and motors (where used) and factory-supplied accessories.

CONDITIONED FLOOR AREA. The horizontal projection of the floors associated with the *conditioned space*.

CONDITIONED SPACE. An area, room or space that is enclosed within the building thermal envelope and that is directly heated or cooled or that is indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate through openings with conditioned spaces, where they are separated from conditioned spaces by uninsulated walls, floors or ceilings, or where they contain uninsulated ducts, piping or other sources of heating or cooling. Elevator shafts, stair enclosures, enclosed corridors connecting *conditioned spaces*, and *enclosed spaces* through which conditioned air is transferred at a rate exceeding three air changes per hour are considered *conditioned spaces* for the purposes of the *building thermal envelope* requirements.

CONTINUOUS INSULATION (CI). Insulating material that is continuous across all structural members without metal thermal bridges other than fasteners that have a total cross-sectional area not greater than 0.04 percent (0.12 percent where all metal thermal bridges are stainless steel) of the envelope surface through which they penetrate, and service openings. It is installed on the interior or exterior or is integral to any opaque surface of the building envelope.

CONTROLLED PLANT GROWTH ENVIRONMENT. Group F and U buildings or spaces that are used exclusively for and specifically controlled to facilitate and enhance plant growth and production by manipulating various indoor environmental conditions. Technologies include indoor agriculture, cannabis growing, hydroponics, aquaculture and aquaponics. Controlled indoor environment variables include, but are not limited to, temperature, air quality, humidity and carbon dioxide.

CONTROLLED RECEPTACLE. An electrical receptacle that is controlled by an *automatic control device*.

CURTAIN WALL. Fenestration products used to create an external nonload-bearing wall that is designed to separate the exterior and interior environments.

DATA ACQUISITION SYSTEM. An electronic system managed by the building owner to collect, tabulate and display metering information.

DATA CENTER. A room or series of rooms that share *Data Center Systems* whose primary function is to house equipment for the processing and storage of electronic data, which has a design total *information technology equipment (ITE)* equipment power density exceeding 20 watts per square foot of conditioned area and a total design ITE equipment load greater than 10 kW.

DATA CENTER SYSTEMS. HVAC systems, electrical systems, equipment, or portions thereof used to condition *ITE* or electrical systems in a *data center*.

DAYLIGHT RESPONSIVE CONTROL. A device or system that provides *automatic* control of electric light levels based on the amount of daylight in a space.

DAYLIGHT ZONE. The portion of the building interior floor area that is illuminated by natural daylight through sidelit and toplit fenestration.

DECORATIVE APPLIANCE, VENTED. A vented appliance wherein the primary function lies in the aesthetic effect of the flames.

DEMAND CONTROL VENTILATION (DCV). A ventilation system capability that provides for the automatic reduction of outdoor air intake below design rates when the actual occupancy of spaces served by the system is less than design occupancy.

DEMAND RECIRCULATION WATER SYSTEM. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe.

DOOR, GARAGE. Doors rated by ASMA 105 with a single panel or sectional panels.

DOOR, NONSWINGING. Roll-up, tilt-up, metal coiling and sliding doors, access hatches, and all other doors that are not swinging doors or garage doors with less *than* or equal to 14 percent glazing.

DOOR, SWINGING. Doors that are hinged on one side and revolving doors.

DUCT. A tube or conduit utilized for conveying air. The air passages of self-contained systems are not to be construed as air ducts.

DUCT SYSTEM. A continuous passageway for the transmission of air that, in addition to ducts, includes duct fittings, dampers, plenums, fans and accessory air-handling equipment and appliances.

DWELLING UNIT. A single unit providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.

DX-DEDICATED OUTDOOR AIR SYSTEM UNITS (DX-DOAS UNITS). A type of air-cooled, water-cooled or water source factory assembled product that dehumidifies 100 percent outdoor air to a low dew point and includes reheat that is capable of controlling the supply dry-bulb temperature of the dehumidified air to the designated supply air temperature. This conditioned outdoor air is then delivered directly or indirectly to the conditioned spaces. It may precondition outdoor air by containing an enthalpy wheel, sensible wheel, desiccant wheel, plate heat exchanger, heat pipes, or other heat or mass transfer apparatus.

CLERESTORY FENESTRATION. An upper region of vertical fenestration provided for the purpose of admitting daylight beyond the perimeter of a space. The entire clerestory fenestration assembly is installed at a height greater than 8 feet above the finished floor.

FENESTRATION AREA. Total area of the fenestration measured using the rough opening, and including the glazing, sash and frame.

FENESTRATION PRODUCT, FIELD-FABRICATED. A fenestration product whose frame is made at the construction site of standard dimensional lumber or other materials that were not previously cut, or otherwise formed with the specific intention of being used to fabricate a fenestration product or exterior door. Field fabricated does not include site-built fenestration.

FENESTRATION PRODUCT, SITE-BUILT. A fenestration designed to be made up of field-glazed or field-assembled units using specific factory cut or otherwise factory-formed framing and glazing units. Examples of site-built fenestration include storefront systems, curtain walls, and atrium roof systems.

***F*-FACTOR.** The perimeter heat loss factor for slab-on-grade floors (Btu/h × ft × °F) [W/(m × K)].

FLOOR AREA, NET. The actual occupied area not including unoccupied accessory areas such as corridors, stairways, toilet rooms, mechanical rooms and closets.

FURNACE ELECTRICITY RATIO. The ratio of furnace electricity use to total furnace energy computed as ratio = $(3.412 \times E_{AE})/1000 \times E_F + 3.412 \times E_{AE})$ where E_{AE} (average annual auxiliary electrical consumption) and E_F (average annual fuel energy consumption) are defined in Appendix N to Subpart B of Part 430 of Title 10 of the Code of Federal Regulations and E_F is expressed in millions of Btus per year.

GENERAL LIGHTING. Lighting that provides a substantially uniform level of illumination throughout an area. General lighting shall not include lighting that provides a dissimilar level of illumination to serve a specific application or decorative feature within such area.

GREENHOUSE. A structure or a thermally isolated area of a building that maintains a specialized sunlit environment that is used exclusively for, and essential to, the cultivation, protection or maintenance of plants. Greenhouses are those that are erected for a period of 180 days or more.

GROUP R. Buildings or portions of buildings that contain any of the following occupancies as established in the *International Building Code:*

1. Group R-1.
2. Group R-2 where located more than three stories in height above grade plane.

HEAT TRAP. An arrangement of piping and fittings, such as elbows, or a commercially available heat trap that prevents thermosyphoning of hot water during standby periods.

HEAT TRAP, PIPE CONFIGURED. A pipe configured heat trap is either, as applicable:

1. A device specifically designed for the purpose or an arrangement of tubing that forms a loop of 360 degrees, or
2. Piping that from the point of connection to the water heater (inlet or outlet) includes a length of piping directed downward before connection to the vertical piping of the supply water or hot-water distribution system.

HEATED SLAB-ON-GRADE FLOOR. Slab-on-grade floor construction in which the heating elements, hydronic tubing, or hot air distribution system is in contact with, or placed within or under, the slab.

HEATED WATER CIRCULATION SYSTEM. A water distribution system having one or more recirculation pumps that pump water from a heated water source through a dedicated hot water circulation pipe or piping system.

HIGH SPEED DOOR. A nonswinging door used primarily to facilitate vehicular access or material transportation, with a minimum opening rate of 32 inches (813 mm) per second, a minimum closing rate of 24 inches (610 mm) per second and that includes an *automatic*-closing device.

HISTORIC BUILDINGS. ((~~Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.~~)) See *Landmark.*

HUMIDISTAT. A regulatory device, actuated by changes in humidity, used for *automatic* control of relative humidity.

HVAC TOTAL SYSTEM PERFORMANCE RATIO (HVAC TSPR). The ratio of the sum of a building's annual heating and cooling load in thousands of Btus to the sum of annual carbon emissions in pounds from energy consumption of the building HVAC systems. Carbon emissions shall be calculated by multiplying site energy consumption by the carbon emission factors from Table C407.1.

IEC DESIGN H MOTOR. An electric motor that meets all of the following:

1. It is an induction motor designed for use with three-phase power.
2. It contains a cage rotor.
3. It is capable of direct-on-line starting.

4. It has 4, 6 or 8 poles.
5. It is rated from 0.4 kW to 1600 kW at a frequency of 60 Hz.

IEC DESIGN N MOTOR. An electric motor that meets all of the following:

1. It is an inductor motor designed for use with three-phase power.
2. It contains a cage rotor.
3. It is capable of direct-on-line starting.
4. It has 2, 4, 6 or 8 poles.
5. It is rated from 0.4 kW to 1600 kW at a frequency of 60 Hz.

INFILTRATION. The uncontrolled inward air leakage into a building caused by the pressure effects of wind or the effect of differences in the indoor and outdoor air density or both.

INFORMATION TECHNOLOGY EQUIPMENT (ITE). *ITE* includes computers, data storage, servers, and network/communication equipment.

INSULATION ENTIRELY ABOVE DECK. A roof with all insulation:

1. Installed above (outside of) the roof structure; and
2. Continuous (i.e., uninterrupted by framing members).

INTEGRATED ENERGY EFFICIENCY RATIO (IEER). A single-number figure of merit expressing cooling part-load EER efficiency for unitary air-conditioning and heat pump equipment on the basis of weighted operation at various load capacities for the equipment.

INTEGRATED PART LOAD VALUE (IPLV). A single number figure of merit based on part-load EER, COP, or kW/ton expressing part-load efficiency for air conditioning and heat pump equipment on the basis of weighted operation at various load capacities for equipment.

INTEGRATED SEASONAL COEFFICIENT OF PERFORMANCE (ISCOP). A seasonal efficiency number that is a combined value based on the formula listed in AHRI Standard 920 of the two COP values for the heating season of a DX-DOAS unit water or air source heat pump, expressed in W/W.

INTEGRATED SEASONAL MOISTURE REMOVAL EFFICIENCY (ISMRE). A seasonal efficiency number that is a combined value based on the formula listed in AHRI Standard 920 of the four dehumidification moisture removal efficiency (MRE) ratings required for DX-DOAS units, expressed in lb. of moisture/kWh.

ISOLATION DEVICES. Devices that isolate HVAC zones so they can be operated independently of one another. Isolation devices include separate systems, isolation dampers and controls providing shutoff at terminal boxes.

IT (INFORMATION TECHNOLOGY) ENERGY. Electrical energy consumed by UPS (uninterruptible power supply) units, servers, and associated electronic data storage and data processing equipment, but not by lighting or HVAC equipment.

LABELED. Equipment, materials or products to which have been affixed a label, seal, symbol or other identifying mark of a nationally recognized testing laboratory, approved agency or other organization concerned with product evaluation that maintains periodic inspection of the production of the above-labeled items and whose labeling indicates either that the equipment, material or product meets identified standards or has been tested and found suitable for a specified purpose.

LANDMARK. A building or structure that is subject to a requirement to obtain a certificate of approval from the City Landmarks Preservation Board before altering or making significant changes to specific features or characteristics, that has been nominated for designation or has been designated for preservation by the City Landmarks Preservation Board, that has been designated for preservation by the State of Washington, has been listed or determined eligible to be listed in the National Register of Historic Places, or is located in a landmark or special review district subject to a requirement to obtain a certificate of approval before making a change to the external appearance of the structure.

LINER SYSTEM (LS). A system that includes the following:

1. A continuous vapor barrier liner membrane that is installed below the purlins and that is uninterrupted by framing members.
2. An uncompressed, unfaced insulation resting on top of the liner membrane and located between the purlins.

For multilayer installations, the last rated *R-value* of insulation is for unfaced insulation draped over purlins and then compressed when the metal roof panels are attached.

LISTED. Equipment, materials, products or services included in a list published by an organization acceptable to the *code official* and concerned with evaluation of products or services that maintains periodic inspection of production of *listed* equipment or materials or periodic evaluation of services and whose listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specified purpose.

LOW SLOPED ROOF. A roof having a slope less than 2 units vertical in 12 units horizontal.

LOW-VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMER. A transformer that is air-cooled, does not use oil as a coolant, has an input voltage less than or equal to 600 volts and is rated for operation at a frequency of 60 hertz.

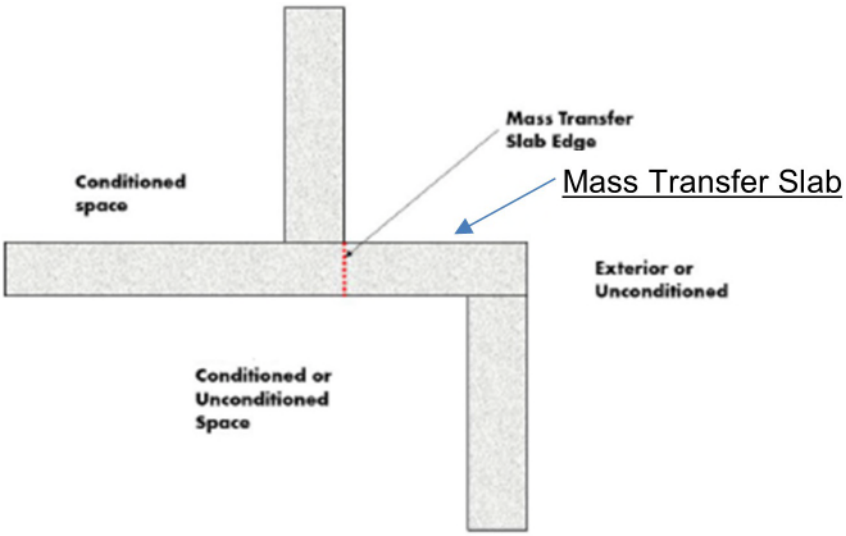
LOW-VOLTAGE LIGHTING. A lighting system consisting of an isolating power supply, the low voltage luminaires, and associated equipment that are all identified for the use.

LUMINAIRE. A complete lighting unit consisting of a lamp or lamps together with the housing designed to distribute the light, position and protect the lamps, and connect the lamps to the power supply.

LUMINAIRE-LEVEL LIGHTING CONTROL. A lighting system consisting of one or more *luminaires* where each *luminaire* has embedded lighting control logic, occupancy and ambient light sensors, and local override switching capability, where required. Each *luminaire* shall also have local or central wireless networking capabilities to detect and share information with other *luminaires* to adjust to occupancy and/or daylight in the space.

MANUAL. Capable of being operated by personal intervention (see "Automatic").

MASS TRANSFER DECK SLAB. ((~~**EDGE.** That portion of the above-grade wall made up of the concrete slab where it extends past the footprint of the floor above, and there is space (conditioned or unconditioned) below the slab.~~)) A concrete slab designed to transfer structural load from the building perimeter wall or column line above, laterally to an offset wall or column line below, and which has conditioned or semi-heated space on the inside of the upper wall and exterior or unconditioned space on the outside of the upper wall. The area of the slab edge shall be defined as the thickness of the slab multiplied by the ((~~perimeter~~)) length of the edge condition. Examples of this condition include, but are not limited to, the transition from an above-grade structure to a below-grade structure or the transition from a tower to a podium. Cantilevered balconies do not meet this definition.



MECHANICAL COOLING. Reducing the temperature of a gas or liquid by using vapor compression, absorption, desiccant dehumidification combined with evaporative cooling, or another energy-driven thermodynamic cycle. Indirect or direct evaporative cooling alone is not considered mechanical cooling.

MECHANICAL HEATING. Raising the temperature of a gas or liquid by use of fossil fuel burners, electric resistance heaters, heat pumps, or other systems that require energy to operate.

MECHANICAL LOAD COEFFICIENT (MLC). In a *data center*, the ratio of the cooling system's net use of energy to that of the *ITE*. The design *MLC* is calculated for a local peak weather condition (stipulated in ASHRAE 90.4) and equals the sum of all active cooling equipment input power, divided by total power into the *ITE*. The annual *MLC* is calculated using hourly TMY3 weather data for the data center's location and equals the sum of all energy flowing into the cooling system to respond to that weather, minus any energy successfully recovered to avoid any new energy use, all divided by the energy flowing into the *ITE* during the same period.

METAL BUILDING ROOF. A roof that:

1. Is constructed with a metal, structural, weathering surface;
2. Has no ventilated cavity; and

3. Has the insulation entirely below deck (i.e., does not include composite concrete and metal deck construction nor a roof framing system that is separated from the superstructure by a wood substrate) and whose structure consists of one or more of the following configurations:
   a. Metal roofing in direct contact with the steel framing members;
   b. Metal roofing separated from the steel framing members by insulation;
   c. Insulated metal roofing panels installed as described in item a. or b.

METER. A device that measures the flow of energy.

MICROCELL. A wireless communication facility consisting of an antenna that is either: (a) Four (4) feet in height and with an area of not more than 580 square inches; or (b) if a tubular antenna, no more than four (4) inches in diameter and no more than six (6) feet in length; and the associated equipment cabinet that is six (6) feet or less in height and no more than 48 square feet in floor area.

MULTI-PASS. A heat pump water heater control strategy requiring multiple passes of water through the heat pump to reach the final target storage water temperature.

NAMEPLATE HORSEPOWER. The nominal motor output power rating stamped on the motor nameplate.

NEMA DESIGN A MOTOR. A squirrel-cage motor that meets all of the following:

1. It is designed to withstand full-voltage starting and developing locked-rotor torque as shown in paragraph 12.38.1 of NEMA MG 1.
2. It has pull-up torque not less than the values shown in paragraph 12.40.1 of NEMA MG 1.
3. It has breakdown torque not less than the values shown in paragraph 12.39.1 of NEMA MG 1.
4. It has a locked-rotor current higher than the values shown in paragraph 12.35.1 of NEMA MG 1 for 60 Hz and paragraph 12.35.2 of NEMA MG 1 for 50 Hz.
5. It has a slip at rated load of less than 5 percent for motors with fewer than 10 poles.

NEMA DESIGN B MOTOR. A squirrel-cage motor that meets all of the following:

1. It is designed to withstand full-voltage starting.
2. It develops locked-rotor, breakdown and pull-up torques adequate for general application as specified in Sections 12.38, 12.39 and 12.40 of NEMA MG 1.
3. It draws locked-rotor current not to exceed the values shown in paragraph 12.35.1 of NEMA MG 1 for 60 Hz and paragraph 12.35.2 of NEMA MG 1 for 50 Hz.
4. It has a slip at rated load of less than 5 percent for motors with fewer than 10 poles.

NEMA DESIGN C MOTOR. A squirrel-cage motor that meets all of the following:

1. It is designed to withstand full-voltage starting and developing locked-rotor torque for high-torque applications up to the values shown in paragraph 12.38.2 of NEMA MG 1 (incorporated by reference; see §431.15).
2. It has pull-up torque not less than the values shown in paragraph 12.40.2 of NEMA MG 1.
3. It has breakdown torque not less than the values shown in paragraph 12.39.2 of NEMA MG 1.
4. It has a locked-rotor current not to exceed the values shown in paragraph 12.35.1 of NEMA MG 1 for 60 Hz and paragraph 12.35.2 of NEMA MG 1 for 50 Hz.
5. It has a slip at rated load of less than 5 percent.

NETWORKED GUEST ROOM CONTROL SYSTEM. A control system, able to be accessed from the front desk or other central location associated with a Group R-1 building, that is capable of identifying the occupancy status of each guest room according to a timed schedule, and is capable of controlling HVAC in each hotel and motel guest room separately.

NONSTANDARD PART LOAD VALUE (NPLV). A single-number part-load efficiency figure of merit calculated and referenced to conditions other than IPLV conditions, for units that are not designed to operate at ARI standard rating conditions.

OCCUPANT SENSOR CONTROL. An *automatic* control device or system that detects the presence or absence of people within an area and causes lighting, equipment or appliances to be regulated accordingly.

ON-SITE RENEWABLE ENERGY. Energy derived from solar radiation, wind, waves, tides, landfill gas, biogas, biomass, or the internal heat of the earth. The energy system providing on-site renewable energy shall be located on the project site.

OPAQUE DOOR. A door that is not less than 50 percent opaque in surface area.

PERSONAL WIRELESS SERVICE FACILITY. A wireless communication facility (WCF), including a microcell, which is a facility for the transmission and/or reception of radio frequency signals and which may include antennas, equipment shelter or cabinet, transmission cables, a support structure to achieve the necessary elevation, and reception and/or transmission devices or antennas.

POWERED ROOF/WALL VENTILATORS. A fan consisting of a centrifugal or axial impeller with an integral driver in a weather-resistant housing and with a base designed to fit, usually by means of a curb, over a wall or roof opening.

POWER-OVER-ETHERNET LIGHTING (POE). Lighting sources powered by DC current utilizing Ethernet cables.

PROPOSED DESIGN. A description of the proposed building used to estimate annual energy use and carbon emissions from energy consumption for determining compliance based on total building performance and *HVAC total performance ratio.*

PUBLIC LAVATORY FAUCET. A lavatory faucet that is not intended for private use as defined by the *Uniform Plumbing Code* and that is supplied with both potable cold and hot water.

RADIANT HEATING SYSTEM. A heating system that transfers heat to objects and surfaces within a conditioned space, primarily by infrared radiation.

READY ACCESS (TO). That which enables a device, appliance or equipment to be directly reached, without requiring the removal or movement of any panel or similar obstruction.

REFRIGERANT DEW POINT. The refrigerant vapor saturation temperature at a specified pressure.

REFRIGERATED WAREHOUSE COOLER. An enclosed storage space that has a total chilled storage area of 3,000 square feet or greater and is designed to maintain a temperature of greater than 32°F but less than 55°F.

REFRIGERATED WAREHOUSE FREEZER. An enclosed storage space that has a total chilled storage area of 3,000 ft^2 and is designed to maintain temperatures at or below 32°F.

REFRIGERATION SYSTEM, LOW TEMPERATURE. Systems for maintaining food product in a frozen state in refrigeration applications.

REFRIGERATION SYSTEM, MEDIUM TEMPERATURE. Systems for maintaining food product above freezing in refrigeration applications.

REGISTERED DESIGN PROFESSIONAL. An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed.

REPAIR. The reconstruction or renewal of any part of an existing building.

REPLACEMENT AIR. Outdoor air that is used to replace air removed from a building through an exhaust system. Replacement air may be derived from one or more of the following: makeup air, supply air, transfer air and infiltration. However, the ultimate source of all replacement air is outdoor air. When replacement air exceeds exhaust, the result is exfiltration.

REROOFING. The process of recovering or replacing an existing roof covering. See “Roof Recover” and “Roof Replacement.”

RESIDENTIAL BUILDING. For this code, includes detached one- and two-family dwellings and multiple single-family dwellings (townhouses) as well as Group R-2 and R-3 buildings three stories or less in height above grade plane.

ROOF ASSEMBLY. A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly includes the roof covering, underlayment, roof deck, insulation, vapor retarder and interior finish. See also *attic and other roofs, metal building roof,* roof with *insulation entirely above deck* and *single-rafter roof.*

ROOF RECOVER. The process of installing an additional *roof covering* over a prepared existing roof covering without removing the existing roof covering.

ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

ROOF REPLACEMENT. The process of removing the existing roof covering, repairing any damaged substrate and installing a new *roof covering.*

ROOFTOP MONITOR. A raised section of a roof containing vertical fenestration along one or more sides.

***R*-VALUE (THERMAL RESISTANCE).** The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area ($h \times ft^2 \times$ °F/Btu) [($m^2 \times K$)/W].

SATURATED CONDENSING TEMPERATURE. The saturation temperature corresponding to the measured refrigerant pressure at the condenser inlet for single component and azeotropic refrigerants, and the arithmetic average of the dew point and *bubble point* temperatures corresponding to the refrigerant pressure at the condenser entrance for zeotropic refrigerants.

SDCI. The Seattle Department of Construction and Inspections.

SEMI-HEATED SPACE. An enclosed space within a building, including adjacent connected spaces separated by an uninsulated component (e.g., basements, utility rooms, garages, corridors), which:

1. Is heated but not cooled, and has an installed heating system output capacity greater than or equal to 3.4 Btu/(h-ft^2) but not greater than 8 Btu/(h-ft^2);

2. Is not a walk-in or warehouse cooler or freezer space.

SENSIBLE RECOVERY EFFECTIVENESS. Change in the dry-bulb temperature of the outdoor air supply divided by the difference between the outdoor air and return air dry-bulb temperatures, expressed as a percentage, governed by AHRI Standard 1060.

SERVICE WATER HEATING. Heating water for domestic or commercial purposes other than space heating and process requirements.

SIDELIT. See Section C405.2.4.2.

SINGLE-PASS. A heat pump water heater control strategy using variable flow or variable capacity to deliver water from the heat pump at the final target storage water temperature in a single pass through the heat exchanger with variable incoming water temperatures.

SINGLE-RAFTER ROOF. A roof where the roof above and the ceiling below are both attached to the same wood rafter and where insulation is located in the space between these wood rafters.

SKYLIGHT. See "Fenestration."

SLAB BELOW GRADE. Any portion of a slab floor in contact with the ground which is more than 24 inches below the final elevation of the nearest exterior grade.

SLAB-ON-GRADE FLOOR. That portion of a slab floor of the building envelope that is in contact with the ground and that is either above grade or is less than or equal to 24 inches below the final elevation of the nearest exterior grade.

SLEEPING UNIT. A room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Such rooms and spaces that are also part of a dwelling unit are not *sleeping units.*

SMALL BUSINESS. Any business entity (including a sole proprietorship, corporation, partnership or other legal entity) which is owned and operated independently from all other businesses, which has the purpose of making a profit, and which has fifty or fewer employees.

SMALL ELECTRIC MOTOR. A general purpose, alternating current, single speed induction motor.

SOLAR HEAT GAIN COEFFICIENT (SHGC). The ratio of the solar heat gain entering the space through the fenestration assembly to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation which is then reradiated, conducted or convected into the space.

SOLAR ZONE. A clear area or areas reserved solely for current and future installation of photovoltaic or solar hot water systems.

SPACE CONDITIONING CATEGORY. Categories are based on the allowed peak space conditioning output capacity per square foot of *conditioned floor area*, or the design set point temperature, for a building or space. Space conditioning categories ((~~from lowest to highest~~)) include: low energy, semi-heated, conditioned, refrigerated walk-in and warehouse coolers, and refrigerated walk-in and warehouse freezers.

STANDARD REFERENCE DESIGN. A version of the *proposed design* that meets the minimum requirements of this code and is used to determine the maximum annual energy use requirement and carbon emissions from energy consumption for compliance based on total building performance and *HVAC total system performance ratio*.

STEEL-FRAMED WALL. A *wall* with a cavity (insulated or otherwise) whose exterior surfaces are separated by steel framing members (i.e., typical steel stud *walls* and curtain *wall systems*).

STOREFRONT. A system of doors and windows mulled as a composite fenestration structure that has been designed to resist heavy use. *Storefront* systems include, but are not limited to, exterior fenestration systems that span from the floor level or above to the ceiling of the same story on commercial buildings, with or without mulled windows and doors.

SUBSYSTEM METER. A meter placed downstream of the energy supply meter that measures the energy delivered to a load or a group of loads.

TEMPERATURE MAINTENANCE. The system used to maintain the temperature of the building domestic hot water delivery system, typically by circulation and reheating or by a heat trace system.

TEMPORARY GROWING STRUCTURE. A temporary growing structure has sides and roof covered with polyethylene, polyvinyl or similar flexible synthetic material and is used to provide plants with either frost protection or increased heat retention. Temporary structures are those that are erected for a period of less than 180 days.

THERMOSTAT. An *automatic* control device used to maintain temperature at a fixed or adjustable set point.

TIME SWITCH CONTROL. An *automatic* control device or system that controls lighting or other loads, including switching off, based on time schedules.

TOPLIT. See Section C405.2.4.3

CHAPTER 3 [CE]

GENERAL REQUIREMENTS

SECTION C301
CLIMATE ZONES

C301.1 General. Climate zones from Table C301.1 shall be used in determining the applicable requirements from Chapter 4. Seattle is in Zone 4-C (4-Marine).

TABLE C301.1
CLIMATE ZONES, MOISTURE REGIMES, AND WARM-HUMID DESIGNATIONS BY STATE AND COUNTY

Key: A – Moist, B – Dry, C – Marine.

Absence of moisture designation indicates moisture regime is irrelevant.

WASHINGTON

5B Adams	4C Grays Harbor	4C Pierce
5B Asotin	4C Island	4C San Juan
5B Benton	4C Jefferson	4C Skagit
5B Chelan	4C King	5B Skamania
4C Clallam	4C Kitsap	4C Snohomish
4C Clark	5B Kittitas	5B Spokane
5B Columbia	5B Klickitat	5B Stevens
4C Cowlitz	4C Lewis	4C Thurston
5B Douglas	5B Lincoln	4C Wahkiakum
6B Ferry	4C Mason	5B Walla Walla
5B Franklin	5B Okanogan	4C Whatcom
5B Garfield	4C Pacific	5B Whitman
5B Grant	5B Pend Oreille	5B Yakima

SECTION C302
DESIGN CONDITIONS

C302.1 Interior design conditions. The interior design temperatures used for heating and cooling load calculations shall be a maximum of 72°F (22°C) for heating and minimum of 75°F (24°C) for cooling.

C302.2 Exterior design conditions. The heating or cooling outdoor design temperatures shall be ((~~selected from Appendix C~~)) 24°F for heating and 86°F dry bulb and 67°F wet bulb for cooling.

SECTION C303
MATERIALS, SYSTEMS AND EQUIPMENT

C303.1 Identification. Materials, systems and equipment shall be identified in a manner that will allow a determination of compliance with the applicable provisions of this code.

C303.1.1 Building thermal envelope insulation. An *R*-value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches (305 mm) or greater in width. Alternatively, the insulation installers shall provide a certification listing the type, manufacturer and *R*-value of insulation installed in each element of the *building thermal envelope.* For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be *listed* on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and *R*-value of installed thickness shall be *listed* on the certification. For insulated siding, the *R*-value shall be labeled on the product's package and shall be listed on the certification. The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

Exception: For roof insulation installed above the deck, the R-value shall be labeled as required by the material standards specified in Table 1508.2 of the *International Building Code.*

TABLE C303.1.3(5)
SMALL BUSINESS COMPLIANCE TABLE
DEFAULT *U*-FACTORS FOR VERTICAL FENESTRATION

Vertical Fenestration Description				Frame Type		
Panes	Low-e[1]	Spacer	Fill	Any Frame	Aluminum Thermal Break[2]	Wood/Vinyl/Fiberglass
Double[3]	A	Any	Argon	0.48	0.41	0.32
	B	Any	Argon	0.46	0.39	0.30
	C	Any	Argon	0.44	0.37	0.28
	C	High Performance	Argon	0.42	0.35	Deemed to comply[5]
Triple[4]	A	Any	Air	0.50	0.44	0.26
	B	Any	Air	0.45	0.39	0.22
	C	Any	Air	0.41	0.34	0.20
	Any double low-e	Any	Air	0.35	0.32	0.18

1. Low-eA (emissivity) shall be 0.24 to 0.16.
   Low-eB (emissivity) shall be 0.15 to 0.08.
   Low-eC (emissivity) shall be 0.07 or less.
2. Aluminum Thermal Break = An aluminum thermal break framed window shall incorporate the following minimum design characteristics:
   a) The thermal conductivity of the thermal break material shall be not more than 3.6 Btu-in/h/ft^2/°F;
   b) The thermal break material must produce a gap in the frame material of not less than 0.210 inches; and
   c) All metal framing members of the products exposed to interior and exterior air shall incorporate a thermal break meeting the criteria in a) and b) above.
3. A minimum air space of 0.375 inches between panes of glass is required for double glazing.
4. A minimum air space of 0.25 inches between panes of glass is required for triple glazing.
5. Deemed to comply glazing shall not be used for performance compliance.

C303.1.4 Insulation product rating. The thermal resistance (*R*-value) of insulation shall be determined in accordance with the U.S. Federal Trade Commission *R*-value rule (C.F.R. Title 16, Part 460) in units of h × ft^2 × °F/Btu at a mean temperature of 75°F (24°C).

C303.1.4.1 Insulated siding. The thermal resistance (*R*-value) shall be determined in accordance with ASTM C1363. Installation for testing shall be in accordance with the manufacturer's installation instructions.

C303.1.5 Spandrel panels in glass curtain walls. Table C303.1.5 provides default U-factors for the spandrel section of glass and other curtain wall systems. Design factors that affect performance are the type of framing, the type of spandrel panel and the R-value of insulation. Four framing conditions are considered in the table. The first is the common case where standard aluminum mullions are used. Standard mullions provide a thermal bridge through the insulation, reducing its effectiveness. The second case is for metal framing members that have a thermal break. A thermal break frame uses a urethane or other non-metallic element to separate the metal exposed to outside conditions from the metal that is exposed to interior conditions. The third case is for structural glazing or systems where there are no exposed mullions on the exterior. The fourth case is for the condition where there is no framing or the insulation is continuous and uninterrupted by framing. The columns in the table can be used for any specified level of insulation between framing members installed in framed curtain walls or spandrel panels.

C303.1.5.1 Window wall application. Where "window wall" or similar assembly that is discontinuous at intermediate slab edges is used, the slab edge U-value shall be as listed in Appendix Table ((~~A103.3.7.1(3)~~)) A103.3.7.2 or as determined using an approved calculation.

C303.1.5.2 Table value assumptions. In addition to the spandrel panel assembly, the construction assembly U-factors assume an air gap between the spandrel panel (with an R-value of 1.39) and one layer of 5/8-inch gypsum board (with an R-value of 0.56) that provides the interior finish. The gypsum board is assumed to span between the window sill and a channel at the floor. For assemblies that differ from these assumptions, custom U-factors can be calculated to account for any amount of continuous insulation or for unusual construction assemblies using Equations 3-1, 3-2 or 3-3 where appropriate. Spandrel panel U-factors for assemblies other than those covered by this table or Equations 1-3 may be determined using an alternate approved methodology. Equations 3-1 through 3-3 do not calculate the value of any insulation inboard of the curtain wall assembly.

CHAPTER 4 [CE]

COMMERCIAL ENERGY EFFICIENCY

SECTION C401
GENERAL

C401.1 Scope. The provisions in this chapter are applicable to commercial buildings and their building sites.

C401.2 Application. Commercial buildings shall comply with one of the following:

1. **Prescriptive Path.** The requirements of ((~~Sections C402, C403, C404, C405, C406, C408, C409, C410 and C411~~)) all of Chapter 4, other than Sections C401.3 and C407.
2. **Total Building Performance Path.** The requirements of Section C407.
3. ((~~When adopted by the local jurisdiction, the requirements of Appendix F, Outcome Based Energy Budget, Sections C408, C409, C410, C411 and any specific section in Table C407.2 as determined by the local jurisdiction. The Proposed Total UA of the proposed building shall be no more than 20 percent higher than the Allowed Total UA as defined in Section C402.1.5.~~)) Appendix F is not adopted by The City of Seattle.
4. **Target Performance Path.** The requirements of Section C401.3.

C401.2.1 Application to existing buildings. Work on existing buildings shall comply with Chapter 5 in addition to the applicable provisions of Chapter 4.

C401.3 Target Performance Path.

C401.3.1 Scope. Buildings of the following occupancy types, including their initial tenant improvements, are permitted to conform to the Target Performance Path as described in this section and are not required to comply with Seattle Energy Code requirements other than the mandatory measures listed in Section C401.3.3.

1. Group B office.
2. Group B medical office.
3. Group R-2 multi-family over three stories.
4. Group S-1 & S-2 warehouse (non-refrigerated).
5. Group E school.
6. Group M retail.
7. Group I-2 hospital.
8. Other occupancy type, where specific permission is granted by the *code official*. Any such permission, if granted, shall be made on the basis of an energy use target *approved* by the *code official* for that occupancy based on the best-performing local examples of that occupancy, adjusted to recognize the additional stringency of the current energy code.
9. Mixed use: A mixed use building is any building containing more than one of the occupancies listed in items 1 through 8 above.

C401.3.1.1 Increased building performance factor. Each building conforming to this section is permitted to have a building performance factor (BPF) no greater than 1.12 times the maximum BPF permitted by Table C407.3(2).

C401.3.1.2 Conversion of energy use to carbon emissions. Energy use in Target Performance Path calculations shall be converted to carbon emissions according to Table C407.3(1).

C401.3.2 Data center energy. Anticipated total *data center* energy use is permitted to be added to the overall building energy usage target in accordance with this section. The anticipated *IT energy* usage shall be multiplied by a factor of 1.45 to determine the anticipated total *data center* energy use. The *IT energy* usage shall be separately sub-metered in a secure manner *approved* by the *code official* and automatically exported to the *code official* showing daily, monthly and annual totals during the operational energy use demonstration period set forth in Section C401.3.6. Actual *IT energy* shall be adjusted in accordance with Section C401.3.7.

C401.3.3 Mandatory measures. Buildings using the Target Performance Path shall:

1. Not exceed the building performance factor (BPF) permitted by Section C401.3.1.1;
2. Not use fossil fuel combustion or electric resistance appliances for purposes of space heating or domestic water heating;
3. Have a building envelope with a Proposed Total UA no greater than the Allowable Total UA as determined by Section C407.3.1; and
4. Comply with the mandatory measures listed in Table C407.2.

C401.3.4 Energy modeling methodology. Energy use shall be modeled according to the requirements of Section C407, Total Building Performance:

Schedules, internal loads and other assumptions related to the operation of the building are permitted to be developed at the discretion of the design team and the energy modeler. For occupancy types listed in Appendix B of this code, where any of the following operating loads or schedules of operating hours used in modeling calculations is less than 80 percent of that listed in Appendix B, or where the occupant density in square feet per occupant is more than 120 percent of that listed in Appendix B, such deviations shall be clearly documented in the final analysis report and are subject to approval by the *code official.*

1. Occupant density and schedule
2. Lighting operation schedule
3. Receptacle loads and schedule
4. Elevator and escalator schedule
5. Water heating quantity and schedule

In addition to documenting modeling assumptions, the application documentation required by Section G1.3.2 of ASHRAE 90.1, Appendix G, shall include the following:

1. Summary of principal building characteristics that are above or below prescriptive energy code requirements.
2. Sensitivity analysis of principal internal load and other building operational assumptions that demonstrate a range of expected energy performance in the context of typical meteorological year (TMY) conditions. The following sensitivity analyses shall be reported, in tabular format:
   - 2.1. Occupant density +/- 20 percent (except residential occupancies)
   - 2.2. Lighting Power Density +/- 20 percent
   - 2.3. Miscellaneous Load Power Density +/- 20 percent
   - 2.4. Infiltration Rates +/- 20 percent
   - 2.5. Temperature Setpoints +/- 2 degrees F

TABLE C401.3.4
EXAMPLE OF SENSITIVITY ANALYSIS REPORT FORMAT

Allowable EUI: 45 kBTU/ft^2		
Predicted EUI: 40 kBTU/ft^2		
INPUT	**EUI (LOW RANGE)**	**EUI (HIGH RANGE)**
Occupant Density	35	42
Lighting Power Density	38	41
Misc. Load Power Density	35	45
Infiltration	38	44
Temperature Setpoints	36	48

The building performance factor (BPF) carbon emissions derived from the modeled building energy use, under nominal conditions, shall be no greater than 1.12 times the BPF listed in Table C407.3(2).

C401.3.5 Energy modeler qualifications. Energy models shall be created only by persons qualified by education and training to perform such work and who have at least two years' experience modeling buildings of similar scale and complexity. The modeling documentation submitted shall be signed either by a licensed professional engineer who is qualified by training and experience to perform energy modeling or by an individual with an active certification from ASHRAE as a Building Energy Modeling Professional (BEMP).

C401.3.6 Demonstration of operating energy use. Metered energy data shall be supplied directly via automated reporting from utilities to the *code official* using Portfolio Manager, and adjusted for the percentage of the *conditioned floor area* intended for occupancy that is occupied during the recording period. While more than 95 percent occupied, the building shall be considered fully occupied. While no less than 85 percent occupied, the building shall operate at or below its assigned building performance factor established in Section C401.3.2 or Item 8 of Section C401.3.1 for any recording period of 12 consecutive months that is completed within three years of the date of the Certificate of Occupancy, as adjusted under this Section C401.3. The owner shall notify the *code official* when this 12-month period has been successfully completed.

C401.3.6.1 Extension of demonstration period. For good cause, including conditions where less than 75 percent of the building is occupied, the *code official* may extend the three-year period for one additional year, but in no case for more than three additional one-year periods. If the building is not at least 75 percent occupied after three additional one-year

periods, the *code official* shall evaluate compliance with Section C401.3.6 based on the most recent one-year period and adjusted for the actual occupancy rate during that period.

C401.3.7 Adjustment for data center energy usage. Where *data center IT energy* usage during the demonstration period, multiplied by a factor of 1.45, is higher than the total *data center* energy use as calculated according to Section C401.3.2, that additional energy shall be added to the total allowable energy use. Where *data center IT energy* use, multiplied by a factor of 1.45, is lower than the total *data center* energy use as calculated according to Section C401.3.2, that shortfall shall be subtracted from the total allowable energy use.

C401.3.8 Adjustment for change in occupancy. When the occupancy of the building or a portion of the building changes from that assumed in the permit submittal, the assigned energy performance target shall be adjusted to reflect the new occupancy. If the new occupancy is not listed in Section C401.3.2, either the *code official* shall assign it an energy use target based on the best-performing local examples of that occupancy type, or a metering system shall be provided that excludes the energy loads for the additional occupancy.

C401.3.9 Adjustment for unusually cold years. If the heating degree days (HDD) recorded by the National Weather Service for the Seattle-Tacoma International Airport exceeds 4885 HDD for the 12-month demonstration period (4 percent above the average 4697 HDD at 65°F base), the assigned energy performance target is permitted to be increased by 1 percent for that period.

C401.3.10 Adjustment for retail operating hours. If the annual number of hours that a retail occupancy is open to the public during the 12-month recording period exceeds the hours assumed in the energy model by more than 4 percent, the annual energy use target for the retail space use only is permitted to be increased by 1 percent for each 4 percent increase in such hours. This claim shall be documented by publicly available published hours of operation.

C401.3.11 Adjustment for commercial kitchens and other large process loads. Where the building includes a commercial kitchen, commercial laundry, hospital central sterile processing facility, or similar large process load, and where *approved* by the *code official*, the energy use of the process equipment and exhaust fans and relief air fans and air tempering associated with the use of that equipment is permitted to be separately sub-metered and subtracted from the overall building energy usage. Energy use of typical HVAC, lighting, and miscellaneous electrical loads within such spaces shall not be included in this adjustment. An *approved* plan shall be submitted with the permit documents detailing how the sub-metered process load energy will be automatically deducted from the total building energy use and the adjusted total reported to the *code official*.

C401.3.12 Financial security. The applicant shall provide a financial security to be used as a penalty for failing to achieve an operating energy use lower than the building's energy use target according to Section C401.3.6. The penalty shall be administered as provided in Section C110, except that the amount of the penalty shall be determined using Table C401.3.13 and not Section C107. The financial security shall be submitted to and *approved* by the *code official* prior to issuance of the building's Certificate of Occupancy. The financial security requirement shall be fulfilled by one of the following methods:

1. An irrevocable letter of credit from a financial institution authorized to do business in Seattle, in an amount equal to $4.00 per square foot of gross *conditioned floor area*.
2. A bond secured by the applicant to ensure compliance with this section, in an amount equal to $4.00 per square foot of gross *conditioned floor area*.
3. A binding pledge that within 3 years of receipt of the Certificate of Occupancy, adjusted as allowed under Section C401.3.6.1, the applicant will comply with the requirements of this section.
   3.1 A binding pledge pursuant to item 3 of this subsection shall be recorded as a covenant in the land records of King County between the applicant and The City of Seattle in a form that is satisfactory to the Seattle City Attorney. The covenant shall bind the applicant and any successors in title to pay any fines levied pursuant to this section. A lien will be placed on the property in cases of non-payment.

If the owner provides evidence that the building has operated at or below its target energy performance level as provided in Section C401.3.6, the financial security provided by the applicant shall be returned to the applicant, or the pledge and covenant shall be released, and the applicant will have no further obligations under this section.

C401.3.13 Procedure for non-compliance. If the owner fails to provide evidence that the building has operated as required under Section C401.3.6, the *code official* shall, as applicable, either:

1. Draw down on a financial security provided in the form of an irrevocable letter of credit or a bond, in whole, or in part, or
2. Levy a fine against an applicant that provided a financial security in the form of a binding pledge as set forth in Section C401.3.12(3). The fine shall be issued as a civil penalty.

The amount of the fine levied or the amount drawn down from a financial security shall be determined according to Table C401.3.13.

C401.3.14 Reimbursements. Where a financial security has been drawn down pursuant to item 1 in Section C401.3.13, or a fine has been levied pursuant to item 2 in Section C401.3.13, the *code official* shall reimburse the owner for documented

expenses incurred to lower the operating energy use of the building, including commissioning, repairs or improvements to the existing energy-consuming systems, or provision of additional energy efficiency measures, up to the maximum reimbursement amounts listed in Table C401.3.13. Such expenditures shall be *approved* in advance by the *code official*, and the work shall be fully completed within one year of the date when a financial security has been drawn down pursuant to item 1 in Section C401.3.13, or a fine has been levied pursuant to item 2 in Section C401.3.13.

TABLE C401.3.13
FINANCIAL SECURITY AND ENERGY EFFICIENCY REIMBURSEMENTS

Energy use exceeding target	Amount of fine or draw-down from financial security, per square foot of gross conditioned floor area	Maximum reimbursement per square foot of gross conditioned floor area for work *approved* under Section C401.3.12
Less than 10%	$1.00	$0.50
10% to less than 20%	$2.00	$1.00
20% to less than 30%	$3.00	$1.50
30% or greater	$4.00	$2.00

SECTION C402
BUILDING ENVELOPE REQUIREMENTS

C402.1 General. Building thermal envelope assemblies for buildings that are intended to comply with the code on a prescriptive basis, in accordance with the compliance path described in Item 1 of Section C401.2, shall comply with the following:

1. The opaque portions of the building thermal envelope shall comply with the specific insulation requirements of Section C402.2 and the thermal requirements of either the *R*-value based method of Section C402.1.3, the U-, C- and F-factor based method of Section C402.1.4, or the component performance alternative of Section C402.1.5.
2. Fenestration in the building envelope assemblies shall comply with Section C402.4, or the component performance alternative of Section C402.1.5.
3. Air leakage of building envelope assemblies shall comply with Section C402.5.

SDCI Informative Note: For the application of the building envelope requirements to elevator shafts and stair enclosures, see the definition of *conditioned space* in Chapter 2 and the exception to Section C402.1.3.

C402.1.1 Low energy buildings, semi-heated buildings and greenhouses. Low energy buildings shall comply with Section C402.1.1.1. Semi-heated buildings and spaces shall comply with Section C402.1.1.2, Greenhouses shall comply with Section C402.1.1.3.

C402.1.1.1 Low energy buildings. The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code shall be exempt from all thermal envelope provisions of this code:

1. Those that are heated and/or cooled with a peak design rate of energy usage less than 3.4 Btu/h × ft^2 (10.7 W/m^2) or 1.0 watt/ft^2 (10.7 W/m^2) of floor area for space conditioning purposes.
2. Those that do not contain conditioned space.
3. Unstaffed equipment shelters or cabinets used solely for personal wireless service facilities.

C402.1.1.2 Semi-heated buildings and spaces. The building envelope of *semi-heated* buildings, or portions thereof, shall comply with the same requirements as that for conditioned spaces in Section C402, except as modified by this section. The total installed output capacity of mechanical space conditioning systems serving a *semi-heated* building or space shall comply with Section C202, except as modified by this section. Building envelope assemblies separating conditioned space from semi-heated space shall comply with the exterior envelope insulation requirements. Semi-heated spaces heated by mechanical systems that do not include electric resistance heating equipment are not required to comply with the opaque wall insulation provisions of Section C402.2.3 for walls that separate semi-heated spaces from the exterior or low energy spaces. Fenestration that forms part of the *building thermal envelope* enclosing semi-heated spaces shall comply with Section C402.4. Semi-heated spaces shall be calculated separately from other conditioned spaces for compliance purposes.

Opaque walls in semi-heated spaces shall be calculated as fully code compliant opaque walls for both the target and proposed for the Target UA calculations for the component performance alternative in Section C402.1.5, and for the ((~~Standard Reference~~)) Baseline Building Design for Total Building Performance compliance per Section C407. The capacity of heat trace temperature maintenance systems complying with Section C404.7.2 that are provided for freeze protection of piping and equipment only, shall not be included in the total installed output capacity of mechanical space conditioning systems.

Exception: Building or space may comply as *semi-heated* when served by ((~~one or more of~~)) the following system ((~~alternatives~~)) alternative:

1. Electric infrared heating equipment for localized heating applications, but not for general area heating, insulated in compliance with Section C402.2.8 and controlled by occupant sensing devices in compliance with Section C403.11.1.

((~~2. Heat pumps with cooling capacity permanently disabled, as pre-approved by the jurisdiction.~~))

SDCI Informative Note: There is no separate "freeze protection" space conditioning category for unoccupied utility buildings. Spaces with no cooling and less than 3.4 BTU/h-ft^2 heating capacity are not required to be insulated. The opaque walls of spaces that meet the definition of "semiheated" in Chapter 2 are not required to be insulated, but otherwise the thermal envelope of semiheated spaces must meet all requirements for *conditioned space*. Spaces with any mechanical cooling or with more than 8 BTU/h-ft^2 heating capacity must meet all the *building thermal envelope* requirements for *conditioned space*.

C402.1.1.3 Greenhouses. *Greenhouse* structures or areas that comply with all of the following shall be exempt from the building envelope requirements of this code:

1. Exterior opaque envelope assemblies complying with Sections C402.2 and C402.4.4.

   Exception: Low energy greenhouses that comply with Section C402.1.1.1.
2. Interior partition *building thermal envelope* assemblies that separate the *greenhouse* from conditioned space complying with Sections C402.2, C402.4.3 and C402.4.4.
3. Non-opaque envelope assemblies complying with the thermal envelope requirements in Table C402.1.1.3. The U-factor for the non-opaque roof shall be for the roof assembly or a roof that includes the assembly and an internal curtain system.

   Exception: Unheated greenhouses.
4. No mechanical cooling is provided.
5. For heated greenhouses, heating is provided by a radiant heating system, a condensing natural gas-fired or condensing propane-fired heating system, or a heat pump with cooling capacity permanently disabled as pre-approved by the jurisdiction.

TABLE C402.1.1.3
NON-OPAQUE THERMAL ENVELOPE MAXIMUM REQUIREMENTS

COMPONENT *U*-FACTOR BTU/H-FT^2-°F	CLIMATE ZONE 5 AND MARINE 4
Non-opaque roof	0.5
Non-opaque SEW wall	0.7
Non-opaque N wall	0.6

C402.1.2 Equipment buildings. Buildings that comply with all of the following shall be exempt from the building thermal envelope provisions of this code:

1. Are separate buildings with floor area no more than 500 square feet (50 m^2).
2. Are intended to house electronic equipment with installed equipment power totaling at least 7 watts per square foot (75 W/m^2) and not intended for human occupancy.
3. Are served by mechanical cooling and heating systems sized in accordance with Sections C403.1.2 and C403.3.1.
4. Have a heating system capacity not greater than 17,000 Btu/hr (5 kW) and a heating thermostat set point that is restricted to not more than 50°F (10°C).
5. Have an average wall and roof *U*-factor less than 0.200.

   Exception: Where the cooling and heating system is a heat pump, the heating system capacity is allowed to exceed 17,000 Btu/h provided the heat pump cooling efficiency is at least 15 percent better than the requirements in Table C403.3.2(2).

C402.1.2.1 Standalone elevator hoistways. Elevator hoistways that comply with all of the following shall be exempt from the building thermal envelope and envelope air barrier provisions of this code:

1. Are separate from any other conditioned spaces in the building (do not serve or open into any conditioned, semi-heated or indirectly conditioned space).
2. Have heating and/or cooling equipment sized only to serve the expected elevator loads with thermostat set points restricted to heating to no higher than 40° F and cooling to no lower than 95° F.
3. Have an area-weighted average wall, roof, and floor (where applicable) U-factor of less than or equal to 0.20. Calculations must include any floor-slab-edges that penetrate the hoistway and thus are considered part of the above-grade walls.

C402.1.3 Insulation component *R*-value method. *Building thermal envelope* opaque assemblies shall comply with the requirements of Section C402.2 based on the climate zone specified in Chapter 3. For opaque portions of the building thermal envelope intended to comply on an insulation component *R*-value basis, the *R*-values for insulation shall not be less than that specified in Table C402.1.3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the "Group R" column of Table C402.1.3. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the "All other" column of Table C402.1.3.

Exception: For stair and elevator shafts that do not comply with Section C402.1.2.1 and that are located within enclosed garages or other enclosed non-conditioned spaces and without conditioned supply air or cooling or heating appliances rated higher than 2 kW in any shaft, walls enclosing the shafts are permitted to be:

1. Concrete or masonry with minimum R-5 *continuous insulation;*
2. Metal studs with R-15 *cavity insulation* and without *continuous insulation;* or
3. Other assemblies with a maximum *U*-value of 0.120.

Slab floors, intermediate mass floor edges and elevator pits within shafts using this exception are excluded from envelope insulation requirements. Shaft surfaces using this exception shall not be included in the gross exterior wall area for purposes of maximum fenestration area calculations in Section C402.4.1 component performance calculations in Section C402.1.5, or for the total building performance calculation of Section C407.

TABLE C402.1.3
OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM REQUIREMENTS, *R*-VALUE METHOD[a, i]

CLIMATE ZONE	5 AND MARINE 4	
	All Other	Group R
Roofs		
Insulation entirely above deck	R-38 ci	R-38 ci
Metal buildings[b]	R-25 + ((~~R-11~~)) R-22 LS	R-25 + ((~~R-11~~)) R-22 LS
Attic and other	R-49	R-49
Walls, Above Grade		
Mass[h]	((~~R-9.5[e] ci~~)) Exterior: R-16 ci Interior: R-13 + R-6 ci wood stud, or R-13 + R-10 ci metal stud	((~~R-13.3 ci~~)) Exterior: R-16 ci Interior: R-13 + R-6 ci wood stud, or R-13 + R-10 ci metal stud
Mass transfer deck slab edge	((~~R-5~~)) N/R	((~~R-5~~)) N/R
Metal building	R-19 ci or R-13 + 13 ci	R-19 ci or R-13 + 13 ci
Steel framed	R-13 + R-10 ci	R-19 + R-8.5 ci
Wood framed and other	((~~R-21 int or R-15 + 5 ci std~~)) R-13 + R-7.5 ci	R-13 + 7.5 ci std or R-20 + 3.8 ci std or R-25 std
Walls, Below Grade		
Below-grade wall[d, h]	((~~Same as above grade~~)) Exterior: R-10 ci Interior: R-19 wood stud, or R-13 + R-6 ci metal stud	((~~Same as above grade~~)) Exterior: R-10 ci Interior: R-19 wood stud, or R-13 + R-6 ci metal stud
Floors		
Mass[f]	R-30 ci	R-30 ci
Joist/framing	((~~R-30[e]~~)) Steel frame: R-38 + R-10 ci Wood frame: R-38	((~~R-30[e]~~)) Steel frame: R-38 + R-10 ci Wood frame: R-38
Slab-on-Grade Floors		
Unheated slabs	R-10 for 24" below	R-10 for 24" below
Heated slabs[d]	R-10 perimeter & under entire slab	R-10 perimeter & under entire slab
Opaque Doors[g]		
Swinging	U-0.37	U-0.37
Nonswinging	R-4.75	R-4.75

Keys for Table C402.1.3

For SI: 1 inch = 25.4 mm. ci = Continuous insulation. NR = No requirement. LS = Liner system

Footnotes for Table C402.1.3

a. Assembly descriptions can be found in Chapter 2 and Appendix A.

b. Where using *R*-value compliance method, a thermal spacer block with minimum thickness of 1/2 inch and minimum *R*-value of R-3.5 shall be provided, otherwise use the *U*-factor compliance method in Table C402.1.4.

c. (Reserved) ((~~Exception: Integral insulated concrete block walls complying with ASTM C90 with all cores filled and meeting both of the following:~~

~~1. At least 50 percent of cores must be filled with vermiculite or equivalent fill insulation; and~~

~~2. The building thermal envelope encloses one or more of the following uses: Warehouse (storage and retail), gymnasium, auditorium, church chapel, arena, kennel, manufacturing plant, indoor swimming pool, pump station, water and waste water treatment facility, storage facility, storage area, motor vehicle service facility. Where additional uses not listed (such as office, retail, etc.) are contained within the building, the exterior walls that enclose these areas may not utilize this exception and must comply with the appropriate mass wall *R*-value from Table C402.1.3/U-factor from Table C402.1.4.~~))

d. Where heated slabs are below grade, they shall comply with the insulation requirements for heated slabs.

e. (Reserved) ((~~Steel floor joist systems shall be insulated to R-38 + R-10ci.~~))

f. "Mass floors" shall include floors weighing not less than:

1. 35 pounds per square foot of floor surface area; or
2. 25 pounds per square foot of floor surface area where the material weight is not more than 120 pounds per cubic foot.

g. Not applicable to garage doors. See Table C402.1.4.

h. Peripheral edges of intermediate concrete floors are included in the above grade mass wall category and therefore must be insulated as above grade mass walls unless they meet the definition of Mass Transfer Deck Slab Edge. The area of the peripheral edges of concrete floors shall be defined as the thickness of the slab multiplied by the perimeter length of the edge condition. See Table A103.3.7.2 for typical default u-factors for above grade slab edges and footnote c for typical conditions of above grade slab edges.

i. Where the total area of through-wall mechanical equipment is greater than 1 percent of the opaque *above-grade wall* area, use of the *R*-value method is not permitted. See Section C402.1.4.2.

((~~i~~)) j. For roof, wall or floor assemblies where the proposed assembly would not be continuous insulation, ((~~an~~)) alternate nominal *R*-value compliance options for assemblies with isolated metal ((~~penetrations of~~)) fasteners that penetrate otherwise continuous insulation ((~~is~~)) are as shown in Columns B and C of Table C402.1.3(i):

TABLE C402.1.3(j)
CONTINUOUS INSULATION EQUIVALENTS

Column A Assemblies with continuous insulation (see definition)	Column B Alternate option for assemblies with metal penetrations, greater than 0.04% but less than 0.08%	Column C Alternate option for assemblies with metal penetrations, greater than or equal to 0.08% but less than 0.12%
R-9.5ci	R-11.9ci	R-13ci
R-11.4ci	R-14.3ci	R-15.7ci
R-13.3ci	R-16.6ci	R-18.3ci
R-15.2ci	R-19.0ci	R-21ci
R-30ci	R-38ci	R-42ci
R-38ci	R-48ci	R-53ci
R-13 + R-7.5ci	R-13 + R-9.4ci	R-13 + R-10.3ci
R-13 + R-10ci	R-13 + R-12.5ci	R-13 + R-13.8ci
R-13 + R-12.5ci	R-13 + R-15.6ci	R-13 + R-17.2ci
R-13 + R-13ci	R-13 + R-16.3ci	R-13 + R-17.9ci
R-19 + R-8.5ci	R-19 + R-10.6ci	R-19 + R-11.7ci
R-19 + R-14ci	R-19 + R-17.5ci	R-19 + R-19.2ci
R-19 + R-16ci	R-19 + R-20ci	R-19 + R-22ci
R-20 + R-3.8ci	R-20 + R-4.8ci	R-20 + R-5.3ci
R-21 + R-5ci	R-21 + R-6.3ci	R-21 + R-6.9ci

Footnotes for Table C402.1.3(j)

((~~This~~)) These alternate nominal *R*-value compliance options ((~~is~~)) are allowed for projects complying with all of the following:

1. The ratio of the cross-sectional area, as measured in the plane of the surface, of metal penetrations of otherwise continuous insulation to the opaque surface area of the assembly is greater than 0.0004 (0.04%), but less than 0.0008 (0.08%), for use of Column B equivalents, and greater than or equal to 0.0008 (0.08%), but less than 0.0012 (0.12%), for use of Column C equivalents.
   a. Where all metal penetrations are stainless steel, Column B is permitted to be used for penetrations greater than 0.12% but less than 0.24% of opaque surface area, and Column C is permitted to be used for penetrations greater than or equal to 0.24% but less than 0.48% of opaque surface area.
2. The metal penetrations of otherwise continuous insulation are isolated or discontinuous (e.g., brick ties or other discontinuous metal attachments, offset brackets supporting shelf angles that allow insulation to go between the shelf angle and the primary portions of the wall structure). No continuous metal elements (e.g., metal studs, z-girts, z-channels, shelf angles) penetrate the otherwise continuous portion of the insulation.
3. Building permit drawings shall contain details showing the locations and dimensions of all the metal penetrations (e.g., brick ties or other discontinuous metal attachments, offset brackets, etc.) of otherwise continuous insulation. In addition, calculations shall be provided showing the ratio of the cross-sectional area of metal penetrations of otherwise continuous insulation to the overall opaque wall area.

For other cases where the proposed assembly is not continuous insulation, see Section C402.1.4 for determination of U-factors for assemblies that include metal other than screws and nails.

C402.1.4 Assembly *U*-factor, *C*-factor or *F*-factor based method. *Building thermal envelope* opaque assemblies shall meet the requirements of Section C402.2 based on the climate zone specified in Chapter 3. Building thermal envelope opaque assemblies intended to comply on an assembly *U*-, *C*-, or *F*-factor basis shall have a U-, C-, or F-factor not greater than that

specified in Table C402.1.4. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *U*-, *C*-, or *F*-factor from the "Group R" column of Table C402.1.4. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *U*-, *C*-, or *F*-factor from the "All Other" column of Table C402.1.4. The *U*-factors for typical construction assemblies are included in Appendix A. These values shall be used for all calculations. Where proposed construction assemblies are not represented in Appendix A, values shall be calculated in accordance with the ASHRAE *Handbook of Fundamentals* using the framing factors listed in Appendix A where applicable and shall include the thermal bridging effects of framing materials.

C402.1.4.1 Thermal resistance of cold-formed steel stud walls. *U*-factors of walls with cold-formed steel studs shall be permitted to be determined either by using the values in Table C402.1.4.1, or in accordance with Equation 4-1:

$$U = 1/[R_s + (ER)] \qquad \textbf{(Equation 4-1)}$$

where:

R_s = The cumulative *R*-value of the wall components along the path of heat transfer, excluding the cavity insulation and steel studs.

ER = The effective *R*-value of the cavity insulation with steel studs.

C402.1.4.2 Thermal resistance of mechanical equipment penetrations. When the total area of penetrations from through-wall mechanical equipment or equipment listed in Table C403.3.2(3) exceeds 1 percent of the opaque *above-grade wall* area, the mechanical equipment penetration area shall be calculated as a separate wall assembly with a default U-factor of 0.5. Mechanical system ducts and louvers, including those for supply, exhaust and relief, and for condenser air intake and outlet, are not considered to be mechanical equipment for the purposes of this section.

Exception: Where mechanical equipment has been tested in accordance with approved testing standards, the mechanical equipment penetration area is permitted to be calculated as a separate wall assembly using the U-factor determined by such test.

TABLE C402.1.4
OPAQUE THERMAL ENVELOPE ASSEMBLY MAXIMUM REQUIREMENTS, *U*-FACTOR METHOD[a, f]

	CLIMATE ZONE 5 AND MARINE 4	
	All Other	**Group R**
Roofs		
Insulation entirely above deck	U-0.027	U-0.027
Metal buildings	((~~U-0.031~~)) U-0.027	((~~U-0.031~~)) U-0.027
Attic and other	U-0.021	U-0.021
Joist or single rafter	U-0.027	U-0.027
Walls, Above Grade		
Mass[g, k]	((~~U-0.104[d]~~)) U-0.057	((~~U-0.078~~)) U-0.057
Mass transfer deck slab edge[j]	U-0.20	U-0.20
Slab penetrating thermal envelope wall[h]	U-0.10	U-0.10
Metal building[k]	U-0.052	U-0.052
Steel framed[k]	U-0.055	U-0.055
Wood framed and other[k]	((~~U-0.054~~)) U-0.051	U-0.051
Walls, Below Grade		
Below-grade wall[b, g]	((~~Same as above grade~~)) U-0.070	((~~Same as above grade~~)) U-0.070
Floors		
Mass[e]	U-0.031	U-0.031
Joist/framing	U-0.029 steel joist U-0.025 wood joist	U-0.029 steel joist U-0.025 wood joist
Concrete column or concrete wall penetrating thermal envelope floor[j]	U-0.55	U-0.55
Concrete slab floor directly above an electrical utility vault	N.R.	N.R.
Slab-on-Grade Floors		
Unheated slabs	F-0.54	F-0.54
Heated slabs[c]	F-0.55	F-0.55
Opaque Doors		
Swinging door	U-0.37	U-0.37
Nonswinging door	U-0.34	U-0.34
Garage door <14% glazing	U-0.31	U-0.31

Footnotes for Table C402.1.4

a. Use of opaque assembly *U*-factors, *C*-factors, and *F*-factors from Appendix A is required unless otherwise allowed by Section C402.1.4.

b. (Reserved) ((~~Where heated slabs are below grade, they shall comply with the *F*-factor requirements for heated slabs.~~))

c. Heated slab *F*-factors shall be determined specifically for heated slabs. Unheated slab factors shall not be used.

d. (Reserved) ((~~Exception: Integral insulated concrete block walls complying with ASTM C90 with all cores filled and meeting both of the following:~~
   1. ~~At least 50 percent of cores must be filled with vermiculite or equivalent fill insulation; and~~
   2. ~~The building thermal envelope encloses one or more of the following uses: Warehouse (storage and retail), gymnasium, auditorium, church chapel, arena, kennel, manufacturing plant, indoor swimming pool, pump station, water and waste water treatment facility, storage facility, storage area, motor vehicle service facility. Where additional uses not listed (such as office, retail, etc.) are contained within the building, the exterior walls that enclose these areas may not utilize this exception and must comply with the appropriate mass wall *R*-value from Table C402.1.3/U-factor from Table C402.1.4.~~))

e. "Mass floors" shall include floors weighing not less than:
   1. 35 pounds per square foot of floor surface area; or
   2. 25 pounds per square foot of floor surface area where the material weight is not more than 120 pounds per cubic foot.

f. Opaque assembly U-factors based on designs tested in accordance with ASTM C1363 shall be permitted. The *R*-value of continuous insulation shall be permitted to be added or subtracted from the original test design.

g. Peripheral edges of intermediate concrete floors are included in the above grade mass wall category and therefore must be insulated as above grade mass walls unless they meet the definition of Mass Transfer Deck Slab Edge. The area of the peripheral edges of concrete floors shall be defined as the thickness of the slab multiplied by the perimeter length of the edge condition. See Table A103.3.7.2 for typical default u-factors for above grade slab edges and footnote c for typical conditions of above grade slab edges.

h. Intermediate concrete floor slabs penetrating the *building thermal envelope* shall comply with Section C402.2.9. The area of such penetrating concrete floor slabs shall be defined as the thickness of the slab multiplied by the length of the penetration. The "exposed concrete" row in Table A103.3.7.2 shall be used for typical default *U*-factors for the penetrating concrete slab.

i. Value applies to concrete columns and concrete walls that interrupt mass floor insulation, but not to perimeter walls or columns separating interior *conditioned* space from exterior space.

j. A mass transfer deck, due to its configuration, is not insulated. The table value (U-0.20) shall be used as the baseline value for component performance, total building performance, or target performance path calculations. For the proposed value, the appropriate value from the top line of Table A104.3.7.2 shall be used.

k. Through-wall mechanical equipment subject to Section C402.1.4.2 shall be calculated at the *U*-factor defined in Section C402.1.4.2. The area-weighted *U*-factor of the wall, including through-wall mechanical equipment, shall not exceed the value in the table.

TABLE C402.1.4.1
EFFECTIVE *R*-VALUES FOR STEEL STUD WALL ASSEMBLIES

NOMINAL STUD DEPTH (inches)	SPACING OF FRAMING (inches)	CAVITY *R*-VALUE (insulation)	CORRECTION FACTOR (F_c)	EFFECTIVE *R*-VALUE (ER) (Cavity *R*-Value × F_c)
3-1/2	16	13	0.46	5.98
		15	0.43	6.45
3-1/2	24	13	0.55	7.15
		15	0.52	7.80
6	16	19	0.37	7.03
		21	0.35	7.35
6	24	19	0.45	8.55
		21	0.43	9.03
8	16	25	0.31	7.75
	24	25	0.38	9.50

C402.1.5 Component performance alternative. Building envelope values and fenestration areas determined in accordance with Equation 4-2 shall be permitted in lieu of compliance with the *U*-factors and *F*-factors in Table C402.1.4 and C402.4 and the maximum allowable fenestration areas in Section C402.4.1.

For buildings with more than one *space conditioning category*, component performance compliance shall be demonstrated separately for each space conditioning category. Interior partition ceilings, walls, fenestration and floors that separate space conditioning areas shall be applied to the component performance calculations for the space conditioning category with the highest level of space conditioning.

Proposed Total UA ≤ Allowable Total UA **(Equation 4-2)**

Where:

Proposed Total UA = UA-glaz-prop + UA sky-prop + UA-opaque-prop + FL-slab-prop

Allowable Total UA = UA-glaz-allow + UA-glaz-excess + UA sky-allow + UA-sky-excess + UA-opaque-allow + FL-slab-allow

UA-glaz-prop = Sum of (proposed *U*-value × proposed area) for each distinct vertical fenestration type, up to code maximum area

UA-sky-prop = Sum of (proposed *U*-value × proposed area) for each distinct skylight type, up to the code maximum area

UA-opaque-prop = Sum of (proposed *U*-value × proposed area) for each distinct opaque thermal envelope type

FL-slab-prop = Sum of (proposed *F*-value × proposed length) for each distinct slab on grade perimeter assembly

UA-glaz-allow = Sum of (code maximum vertical fenestration *U*-value from Table C402.4, or Section C402.4.1.1.2 if applicable, × proposed area) for each distinct vertical fenestration type, not to exceed the code maximum area[1]

UA-glaz-excess = *U*-value for the proposed wall type from Table ((~~C402.4~~[2])) C402.1.4[2] × vertical fenestration area in excess of the code maximum area

UA-sky-allow = Sum of (code maximum skylight *U*-value from Table C402.4 × proposed area) for each distinct skylight type proposed, not to exceed the code maximum area

UA-sky-excess = *U*-value for the proposed roof type from Table C402.4[3] × skylight area in excess of the code maximum area

UA-opaque-allow = Code maximum opaque envelope *U*-value from Table C402.1.4 for each opaque door, wall, roof, and floor assembly × proposed area

FL-slab-allow = Code maximum *F*-value for each slab-on-grade perimeter assembly × proposed length

Notes

1. Where multiple vertical fenestration types are proposed and the code maximum area is exceeded, the *U*-value shall be the average Table C402.1.4 *U*-value weighted by the proposed vertical fenestration area of each type.
2. Where multiple wall types are proposed the *U*-value shall be the average Table C402.1.4 *U*-value weighted by the proposed above grade wall area of each type.

3. Where multiple roof types are proposed the *U*-value shall be the average Table C402.1.4 *U*-value weighted by the proposed roof area of each type.

C402.1.5.1 Component *U*-factors and F-factors. The *U*-factors and *F*-factors for typical construction assemblies are included in Chapter 3 and Appendix A. These values shall be used for all calculations. Where proposed construction assemblies are not represented in Chapter 3 or Appendix A, values shall be calculated in accordance with the ASHRAE *Handbook of Fundamentals*, using the framing factors listed in Appendix A.

For envelope assemblies containing metal framing, the *U*-factor shall be determined by one of the following methods:

1. Results of laboratory measurements according to acceptable methods of test.
2. ASHRAE *Handbook of Fundamentals* where the metal framing is bonded on one or both sides to a metal skin or covering.
3. The zone method as provided in ASHRAE *Handbook of Fundamentals.*
4. Effective framing/cavity *R*-values as provided in Appendix A. When return air ceiling plenums are employed, the roof/ceiling assembly shall:
   a. For thermal transmittance purposes, not include the ceiling proper nor the plenum space as part of the assembly; and
   b. For gross area purposes, be based upon the interior face of the upper plenum surface.
5. Tables in ASHRAE 90.1 Normative Appendix A.
6. Calculation method for steel-framed walls in accordance with Section C402.1.4.1 and Table C402.1.4.1.

C402.1.5.2 SHGC rate calculations. Fenestration SHGC values for individual components and/or fenestration are permitted to exceed the SHGC values in Table C402.4 and/or the maximum allowable fenestration areas in Section C402.4.1 where the proposed total SHGC×A is less than the allowable total SHGC×A as determined by Equation 4-3.

Proposed Total SHGC×A ≤ Allowable Total SHGC×A **(Equation 4-3)**

Where:

Proposed Total SHGC×A	=	SHGC×A-glaz-prop + SHGC×A sky-prop
Allowable Total SHGC×A	=	SHGC×A-glaz-allow + SHGC×A-sky-allow
SHGC×A-glaz-prop	=	Sum of (proposed SHGC × proposed area) for each distinct vertical fenestration type
SHGC×A-sky-prop	=	Sum of (proposed SHGC x proposed area) for each distinct skylight type
SHGC×A-glaz-allow	=	Sum of (code maximum vertical fenestration SHGC from Table C402.4, or Section C402.4.1.3 if applicable, × proposed area) for each distinct vertical fenestration type, not to exceed the code maximum area
SHGC×A-sky-allow	=	Sum of (code maximum skylight SHGC from Table C402.4 × proposed area) for each distinct skylight type, not to exceed the code maximum area

If the proposed vertical fenestration area does not exceed the Vertical Fenestration Area allowed, the target area for each vertical fenestration type shall equal the proposed area. If the proposed vertical fenestration area exceeds the Vertical Fenestration Area allowed, the target area of each vertical fenestration element shall be reduced in the base envelope design by the same percentage and the net area of each above-grade wall type increased proportionately by the same percentage so that the total vertical fenestration area is exactly equal to the Vertical Fenestration Area allowed.

If the proposed skylight area does not exceed the Allowable Skylight Area from Section C402.4.1, the target area shall equal the proposed area. If the proposed skylight area exceeds the Allowable Skylight Area from Section C402.4.1, the area of each skylight element shall be reduced in the base envelope design by the same percentage and the net area of each roof type increased proportionately by the same percentage so that the total skylight area is exactly equal to the allowed percentage per Section C402.3.1 of the gross roof area.

C402.2 Specific building thermal envelope insulation requirements. Insulation in building thermal envelope opaque assemblies shall comply with Sections C402.2.1 through ((~~C402.2.6~~)) C402.2.10 and Table C402.1.3.

Where this section refers to installing insulation levels as specified in Section C402.1.3, assemblies complying with Section ((~~C402.1.5~~)) C402.1.4 and buildings complying with Section C402.1.5 are allowed to install alternate levels of insulation so long as the U-factor of the insulated assembly is less than or equal to the U-factor required by the respective path.

C402.2.1 Roof assembly. The minimum thermal resistance (*R*-value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table C402.1.3, based on construction materials used in the roof assembly. Continuous insulation board shall be installed in not less than 2 layers and the edge joints between

each layer of insulation shall be staggered. Insulation installed on a suspended ceiling with removable ceiling tiles shall not be considered part of the minimum thermal resistance of the roof insulation.

Exceptions:

1. Continuously insulated roof assemblies where the thickness of insulation varies 1 inch (25 mm) or less and where the area-weighted *U*-factor is equivalent to the same assembly with the *R*-value specified in Table C402.1.3.
2. (Reserved) ((~~Where tapered insulation is used with insulation entirely above deck, those roof assemblies shall show compliance on a *U*-factor basis per Section C402.1.4. The effective *U*-factor shall be determined through the use of Tables A102.2.6(1), A102.2.6(2) and A102.2.6(3).~~))
3. Two layers of insulation are not required where insulation tapers to the roof deck, such as at roof drains. At roof drains, the immediate 24" × 24" plan area around each roof drain has a minimum insulation requirement of R-13, but otherwise is permitted to be excluded from roof insulation area-weighted calculations.

C402.2.1.1 Skylight curbs. Skylight curbs shall be insulated to the level of roofs with insulation entirely above deck or R-5, whichever is less.

Exception: Unit skylight curbs included as a component of skylight listed and labeled in accordance with NFRC 100 shall not be required to be insulated.

C402.2.1.2 Rooftop HVAC equipment curbs. Structural curbs installed to support rooftop HVAC equipment are allowed to interrupt the above roof insulation. The area under the HVAC equipment inside of the equipment curb shall be insulated to a minimum of R-13 in all locations where there are not roof openings for ductwork. The annular space between the roof opening and the ductwork shall be sealed to maintain the building air barrier. The plan-view area of the HVAC equipment curb shall be excluded from the prescriptive roof insulation requirements or the area-weighted component performance calculations.

C402.2.2 Reserved.

C402.2.3 Above-grade walls. The minimum thermal resistance (*R*-value) of materials installed in the wall cavity between the framing members and continuously on the walls shall be as specified in Table C402.1.3, based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with Table C402.1.3 except as otherwise noted in the table. In determining compliance with Table C402.1.4, the use of the U-factor of concrete masonry units with integral insulation shall be permitted.

"Mass walls" where used as a component in the thermal envelope of a building shall comply with one of the following:

1. Weigh not less than 35 psf (170 kg/m^2) of wall surface area.
2. Weigh not less than 25 psf (120 kg/m^2) of wall surface area where the material weight is not more than 120 pounds per cubic foot (pcf) (1,900 kg/m3).
3. Have a heat capacity exceeding 7 Btu/ft^2 × °F (144 kJ/m^2 × K).
4. Have a heat capacity exceeding 5 Btu/ft^2 x° F (103 kJ/m^2 × K) where the material weight is not more than 120 pcf (1900 kg/m^3).

C402.2.4 Below-grade walls. The *R*-value of the insulating material installed in, or continuously on, the below-grade walls shall be in accordance with Table C402.1.3. The U-factor or *R*-value required shall extend to the level of the lowest floor of the conditioned space enclosed by the below-grade wall.

C402.2.5 Floors. The thermal properties (component *R*-values or assembly *U*- or *F*-factors) of floor assemblies over outdoor air or unconditioned space shall be as specified in Table C402.1.3 or C402.1.4 based on the construction materials used in the floor assembly. Floor framing cavity insulation or structural slab insulation shall be installed to maintain permanent contact with the underside of the subfloor decking or structural slabs.

"Mass floors" where used as a component of the thermal envelope of a building shall provide one of the following weights:

1. 35 pounds per square foot of floor surface area.
2. 25 pounds per square foot of floor surface area where the material weight is not more than 120 pounds per cubic foot.

Exceptions:

1. The floor framing cavity insulation or structural slab insulation shall be permitted to be in contact with the top side of sheathing or continuous insulation installed on the bottom side of floor assemblies where combined with insulation that meets or exceeds the minimum *R*-value in Table C402.1.3 for "Metal framed" or "Wood framed and other" values for "Walls, Above Grade" and extends from the bottom of the top of all perimeter floor framing or floor assembly members.
2. Insulation applied to the underside of concrete floor slabs shall be permitted an air space of not more than 1 inch where it turns up and is in contact with the underside of the floor under walls associated with the *building thermal envelope.*

C402.2.6 Slabs-on-grade perimeter insulation. Where the slab-on-grade is in contact with the ground, the minimum thermal resistance (*R*-value) of the insulation around the perimeter of unheated or heated slab-on-grade floors designed in accordance with the *R*-value method of Section C402.1.3 shall be as specified in Table C402.1.3. The insulation shall be placed on the outside of the foundation or on the inside of the foundation wall. The insulation shall extend downward from the top of the slab for a minimum distance as shown in the table or to the top of the footing, whichever is less, or downward to at least the bottom of the slab and then horizontally to the interior or exterior for the total distance shown in the table. Insulation extending away from the building shall be protected by pavement or by a minimum of 10 inches (254 mm) of soil. Insulation complying with Table C402.1.3 shall be provided under the entire area of heated slabs-on-grade.

Exception: Where the slab-on-grade floor is greater than 24 inches (61 mm) below the finished exterior grade, perimeter insulation is not required.

C402.2.7 Airspaces. Where the thermal properties of airspaces are used to comply with this code in accordance with Section C401.2, such airspaces shall be enclosed in an unventilated cavity constructed to minimize airflow into and out of the enclosed airspace. Airflow shall be deemed minimized where the enclosed airspace is located on the interior side of the continuous air barrier and is bounded on all sides by building components.

Exception: The thermal resistance of airspaces located on the exterior side of the continuous air barrier and adjacent to and behind the exterior wall covering material shall be determined in accordance with ASTM C1363 modified with an airflow entering the bottom and exiting the top of the airspace at a minimum air movement rate of not less than 70 mm/sec.

C402.2.8 Insulation of radiant heating systems. *Radiant heating system* panels and their associated components that are installed in interior or exterior assemblies shall be insulated to an *R*-value of not less than R-3.5 on all surfaces not facing the space being heated. Radiant heating system panels that are installed in the *building thermal envelope* shall be separated from the exterior of the building or unconditioned or exempt spaces by not less than the *R*-value of the insulation installed in the opaque assembly in which they are installed or the assembly shall comply with Section C402.1.4.

Exception: Heated slabs-on-grade insulated in accordance with Section C402.2.6.

C402.2.9 Above-grade exterior concrete slabs. Above-grade concrete slabs that penetrate the *building thermal envelope*, including but not limited to decks and balconies, shall each include a minimum R-10 thermal break, aligned with the primary insulating layer in the adjoining wall assemblies. Stainless steel (but not carbon steel) reinforcing bars are permitted to penetrate the thermal break. If the Total Building Performance path, the Target Performance Path, or the component performance alternative in Section C402.1.5 is utilized and the thermal break required by this section is not provided where concrete slabs penetrate the *building thermal envelope*, the sectional area of the penetration shall be assigned the default *U*-factors from the "exposed concrete" row of Table A103.3.7.2.

Exception: *Mass transfer deck slab* edges.

C402.2.10 Vertical fenestration intersection with opaque walls. *Vertical fenestration* shall comply with items 1, 2 and 3, as applicable:

1. Where wall assemblies include *continuous insulation*, the exterior glazing layer of *vertical fenestration* and any required thermal break in the frame shall each be aligned within 2 inches laterally of either face of the *continuous insulation* layer.
2. Where wall assemblies do not include *continuous insulation*, the exterior glazing layer of *vertical fenestration* and any required thermal break in the frame shall each be aligned within the thickness of the *wall* insulation layer and not more than 2 inches laterally from the exterior face of the outermost insulation layer.
3. Where the exterior face of the *vertical fenestration* frame does not extend to the exterior face of the opaque wall rough opening, the exposed exterior portion of the rough opening shall be covered with either a material having an *R*-value not less than R-3, or with minimum 1.5-inch thickness wood.

C402.3 Reserved.

C402.4 Fenestration. Fenestration shall comply with Sections C402.4 through C402.4.4 and Table C402.4. Daylight responsive controls shall comply with this section and Section ((~~C405.2.4.1~~)) C405.2.4.

Exception: For prescriptive envelope compliance, single-pane glazing is permitted for security purposes and for revolving doors, not to exceed 1 percent of the gross exterior wall area. Where Section C402.1.5, component performance alternative, is used, the single glazing shall be included in the percentage of the total glazing area, *U*-factor and SHGC requirements.

TABLE C402.4
BUILDING ENVELOPE FENESTRATION MAXIMUM *U*-FACTOR AND SHGC REQUIREMENTS

CLIMATE ZONE	5 AND MARINE 4	
***U*-factor for Class AW windows rated in accordance with AAMA/CSA101/I.S.2/A440, vertical curtain walls and site-built fenestration products[a]**		
Fixed[b] *U*-factor	((~~U-0.38~~)) U-0.34	
Operable *U*-factor	((~~U-0.40~~)) U-0.36	
Entrance doors[d]		
U-factor	U-0.60	
U-factor for all other vertical fenestration		
Fixed *U*-factor	((~~U-0.30~~)) U-0.26	
Operable[c] *U*-factor	U-0.28	
SHGC for all vertical fenestration		
Orientation[a]	**SEW**	**N**
PF < 0.2	0.38	0.51
0.2 ≤ PF < 0.5	0.46	0.56
PF ≥ 0.5	0.61	0.61
Skylights		
***U*-factor**	((~~U-0.50~~)) U-0.45	
SHGC	((~~0.35~~)) 0.32	

Footnotes for Table C402.4

a. U-factor and SHGC shall be rated in accordance with NFRC 100.
b. "Fixed" includes curtain wall, storefront, picture windows, and other fixed windows.
c. "Operable" includes openable fenestration products other than "entrance doors."
d. "Entrance door" includes glazed swinging entrance doors and *automatic* glazed sliding *entrance doors*. Other doors which are not entrance doors, including manually operated sliding glass doors, are considered "operable."
e. "N" indicates vertical fenestration oriented within 30 degrees of true north. "SEW" indicates orientations other than "N."
f. Fenestration that is entirely within the conditioned space or is between conditioned and other enclosed space is exempt from solar heat gain coefficient requirements and not included in the SHGC calculation.

SDCI Informative Note: The category at the top of Table C402.4, labeled *"U-factor for Class AW windows rated in accordance with AAMA/CSA101/I.S.2/A440, vertical curtain walls and site-built fenestration products,"* includes *curtain wall*, storefront, ribbon wall, window wall, and similar site-assembled systems, but does not include typical punched-opening manufactured windows except for "Class AW" windows. Class AW is the AAMA designation for windows typically used in mid-rise and high-rise buildings to resist high wind and water intrusion loads.

C402.4.1 Maximum area. The total building vertical fenestration area (not including opaque doors and opaque spandrel panels) shall not exceed ((~~30~~)) 35 percent of the total building gross above-grade wall area. The skylight area shall not exceed 5 percent of the total building gross roof area (skylight-to-roof ratio).

For buildings with more than one *space conditioning category*, compliance with the maximum allowed window-to-wall ratio and skylight-to-roof ratio shall be demonstrated separately for each *space conditioning category*. Interior partition ceiling, wall, fenestration and floor areas that separate space conditioning areas shall not be applied to the window-to-wall ratio and skylight-to-roof ratio calculations.

Exception: For vertical fenestration at street level retail or for other occupancies where the Seattle Land Use Code requires street-level transparency, the fenestration area shall not exceed 75 percent of the area of the street-level wall that faces the street or that adjoins other pedestrian areas used for retail access. For the purposes of this exception, the street-level wall shall be measured from the street-level floor to the interior ceiling level or to 20 feet above floor level, whichever is lowest. When this exception is used, separate calculations shall be performed for these sections of the building envelope, and these values shall not be averaged with any others for compliance purposes. On the street level the 75 percent fenestration area is permitted to be exceeded, if the additional fenestration area is deducted from fenestration allowances from other areas of the building.

C402.4.1.1 Vertical fenestration maximum area with high performance alternates. For buildings that comply with Section C402.4.1.1.1 or C402.4.1.1.2, the total building vertical fenestration area is permitted to exceed ((~~30~~)) 35 percent but shall not exceed 40 percent of the gross above grade wall area for the purpose of prescriptive compliance with Section C402.1.4.

When determining compliance using the component performance alternative in accordance with Section C402.1.5, the total building vertical fenestration area allowed in Equation 4-2 is 40 percent of the above grade wall area for buildings that comply with the vertical fenestration alternates described in this section.

C402.4.1.1.1 Optimized daylighting. All of the following requirements shall be met:

1. Not less than 50 percent of the total *conditioned floor area* in the building is within a *daylight zone* that includes *daylight responsive controls* complying with Section C405.2.4.1.
2. Visible transmittance (VT) of all *vertical fenestration* in the building is greater than or equal to 1.1 times the required solar heat gain coefficient (SHGC) in accordance with Section C402.4, or 0.50, whichever is greater. It shall be permitted to demonstrate compliance based on the area weighted average *VT* being greater than or equal to the area weighted average of the minimum *VT* requirements.

   Exception: Fenestration that is outside the scope of NFRC 200 is not required to comply with Item 2.

C402.4.1.1.2 High-performance *fenestration.* All of the following requirements shall be met:

1. All *vertical fenestration* in the building shall comply with the following maximum U-factors:
   a. U-factor for Class AW windows rated in accordance with AAMA/CSA101/I.S.2/A440, vertical curtain walls and site-built fenestration products (fixed) = ((~~0.34~~)) 0.30
   b. U-factor for Class AW windows rated in accordance with AAMA/CSA101/I.S.2/A440, vertical curtain walls and site-built fenestration products (operable) = 0.36
   c. Entrance doors = 0.60
   d. U-factor for all other vertical fenestration, fixed = ((~~0.28~~)) 0.22
   e. U-factor for all other vertical fenestration, operable = 0.24
2. The SHGC of the vertical fenestration shall be ((~~less than or equal to 0.35, adjusted for projection factor in compliance with C402.4.3~~)) no more than 0.90 times the maximum SHGC values listed in Table C402.4.

An area-weighted average shall be permitted to satisfy the U-factor requirement for each fenestration product category listed in Item 1 of this section. Individual fenestration products from different fenestration product categories shall not be combined in calculating the area-weighted average *U*-factor.

C402.4.2 Minimum skylight fenestration area. For buildings with single story enclosed spaces greater than 2,500 square feet (232 m^2) in floor area that are directly under a roof and have a ceiling height greater than 15 feet (4572 mm) for no less than 75 percent of the ceiling area; these single-story spaces shall be provided with *skylights* and *daylight responsive controls* in accordance with Section C405.2.4. Space types required to comply with this provision include office, lobby, atrium, concourse, corridor, gymnasium/exercise center, convention center, automotive service, manufacturing, nonrefrigerated warehouse, retail store, distribution/sorting area, transportation, and workshop. Skylights in these spaces are required to provide a total toplit zone area not less than 50 percent of the floor area and shall provide one of the following:

1. A minimum ratio of skylight area to toplit daylight zone area of not less than 3 percent where all skylights have a VT of at least 0.40 as determined in accordance with Section C303.1.3
2. A minimum skylight effective aperture of at least 1 percent determined in accordance with Equation 4-5.

$$\text{Skylight Effective Aperture} = \frac{(0.85 \times \text{Skylight Area} \times \text{Skylight VT} \times \text{WF})}{\text{Toplit Zone}} \qquad \textbf{(Equation 4-4)}$$

where:

Skylight area	=	Total fenestration area of skylights.
Skylight VT	=	Area weighted average visible transmittance of skylights.
WF	=	Area weighted average well factor, where well factor is 0.9 if light well depth is less than 2 feet (610 mm), or 0.7 if light well depth is 2 feet (610 mm) or greater, or 1.0 for *tubular daylighting devices* with *VT-annual* ratings measured according to NFRC 203.
Light well depth	=	Measure vertically from the underside of the lowest point of the skylight glazing to the ceiling plane under the skylight.

Exceptions:

1. Skylights above daylight zones of enclosed spaces are not required in:
   1.1. Reserved.
   1.2. Spaces where the designed *general lighting* power densities are less than 0.5 W/ft^2 (5.4 W/m^2) and at least 10 percent lower than the lighting power allowance in Section C405.4.2.
   1.3. Areas where it is documented that existing structures or natural objects block direct beam sunlight on at least half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 a.m. and 4 p.m.

1.4. Spaces where the daylight zone under rooftop monitors is greater than 50 percent of the enclosed space floor area.

1.5. Spaces where the total floor area minus the sidelit zone area is less than 2,500 square feet (232 m^2), and where the lighting in the daylight zone is controlled in accordance with Section ((~~C405.2.3.1~~)) C405.2.4.

2. The skylight effective aperture, calculated in accordance with Equation 4-5, is permitted to be 0.66 percent in lieu of one percent if the *VT-annual* of the skylight or TDD, as measured by NFRC 203, is greater than 38 percent.

C402.4.2.1 Lighting controls in daylight zones under skylights. *Daylight responsive controls* complying with Section ((~~C405.2.4.1~~)) C405.2.4 shall be provided to control all electric lights within toplit zones.

C402.4.2.2 Haze factor. Skylights in office, storage, automotive service, manufacturing, nonrefrigerated warehouse, retail store, and distribution/sorting area spaces shall have a glazing material or diffuser with a haze factor greater than 90 percent when tested in accordance with ASTM D 1003.

Exception: Skylights designed and installed to exclude direct sunlight entering the occupied space by the use of fixed or automated baffles, or the geometry of skylight and light well.

C402.4.2.3 Daylight zones. Daylight zones referenced in Sections C402.4.1.1 through C402.4.2.2 shall comply with Section C405.2.4.2 and C405.2.4.3, as applicable. Daylight zones shall include *toplit* zones and *sidelit* zones.

C402.4.3 Maximum *U*-factor and SHGC. The maximum *U*-factor and solar heat gain coefficient (SHGC) for fenestration shall be as specified in Table C402.4.

The window projection factor shall be determined in accordance with Equation 4-6.

$$PF = A/B \qquad \textbf{(Equation 4-6)}$$

Where:

PF = Projection factor (decimal).

A = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing.

B = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.

Where different windows or glass doors have different PF values, they shall each be evaluated separately.

C402.4.3.1 Reserved

C402.4.3.2 Reserved.

C402.4.3.3 Dynamic glazing. Where *dynamic glazing* is intended to satisfy the SHGC and VT requirements of Table C402.4, the ratio of the higher to lower labeled SHGC shall be greater than or equal to 2.4, and the dynamic glazing shall be automatically controlled to modulate the amount of solar gain into the space in multiple steps. Dynamic glazing shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not dynamic glazing shall not be permitted.

Exception: Dynamic glazing is not required to comply with this section where both the lower and higher labeled SHGC already comply with the requirements of Table C402.4.

C402.4.3.4 Area-weighted *U*-factor. An area-weighted average shall be permitted to satisfy the *U*-factor requirements for each fenestration product category listed in Table C402.4. Individual fenestration products from different fenestration product categories listed in Table C402.4 shall not be combined in calculating area-weighted average *U*-factor.

C402.4.4 Doors. Opaque swinging doors shall comply with Table C402.1.4. Opaque non-swinging doors shall comply with Table C402.1.3. Opaque doors shall be considered part of the gross area of above grade walls that are part of the *building thermal envelope*. Other doors shall comply with the provisions of Section C402.4.3 for vertical fenestration and the entire door area, including the frame, shall be considered part of the fenestration area of the building thermal envelope.

C402.5 Air leakage—thermal envelope. The thermal envelope of buildings shall comply with Sections C402.5.1 through C402.5.8.

C402.5.1 Air barriers. A continuous air barrier shall be provided throughout the building thermal envelope. The air barriers shall be permitted to be located on the inside or outside of the building envelope, located within the assemblies composing the envelope, or any combination thereof. The air barrier shall comply with Sections C402.5.1.1 and C402.5.1.2.

C402.5.1.1 Air barrier construction. The *continuous air barrier* shall be constructed to comply with the following:

1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.
2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.

3. Penetrations of the air barrier shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Sealing shall allow for expansion, contraction and mechanical vibration. Joints and seams associated with penetrations shall be sealed in the same manner or taped. Sealing materials shall be securely installed around the penetrations so as not to dislodge, loosen or otherwise impair the penetrations' ability to resist positive and negative pressure from wind, stack effect, and mechanical ventilation. Sealing of concealed fire sprinklers, where required, shall be in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.
4. Recessed lighting fixtures shall comply with Section C402.5.8. Where similar objects are installed which penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.
5. Construction documents shall contain a diagram showing the building's pressure boundary in plan(s) and section(s) and a calculation of the area of the pressure boundary to be considered in the test.

SDCI Informative Note: The continuous air barrier is intended to control the air leakage into and out of the *conditioned space*. The definition of *conditioned space* includes semi-heated spaces, so these spaces are included when detailing the continuous air barrier and when determining the pressure boundary for conducting the air leakage test. However, unheated spaces are not included when determining the pressure boundary.

C402.5.1.2 Building test. The completed building shall be tested and the air leakage rate of the *building envelope* shall not exceed 0.25 cfm/ft^2 at a pressure differential of 0.3 inches water gauge (((~~2.0~~)) 1.27 L/s × m^2 at 75 Pa))) at the upper 95 percent confidence interval in accordance with ASTM E 779 or an equivalent method approved by the *code official.* A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to the building owner and the *code official.* If the tested rate exceeds that defined here by up to 0.15 cfm/ft^2, a visual inspection of the air barrier shall be conducted and any leaks noted shall be sealed to the extent practicable. An additional report identifying the corrective actions taken to seal air leaks shall be submitted to the building owner and the Code Official and any further requirement to meet the leakage air rate will be waived. If the tested rate exceeds 0.40 cfm/ft^2, corrective actions must be made and the test completed again. A test above 0.40 cfm/ft^2 will not be accepted.

1. Test shall be accomplished using either (1) both pressurization and depressurization or (2) pressurization alone, but not depressurization alone. The test results shall be plotted against the correct P for pressurization in accordance with Section 9.4 of ASTM E779.
2. The test pressure range shall be from 25 Pa to 80 Pa per Section 8.10 of ASTM E779, but the upper limit shall not be less than 50 Pa, and the difference between the upper and lower limit shall not be less than 25 Pa.
3. If the pressure exponent *n* is less than 0.45 or greater than 0.85 per Section 9.6.4 of ASTM E779, the test shall be rerun with additional readings over a longer time interval.

C402.5.1.2.1 Building test for mixed-use buildings. Where a building is three or fewer stories above grade plane and contains both commercial and residential uses, the air barrier of the R-2 and R-3 occupancy areas of the building is permitted to be separately tested according to Section R402.4.1.2. Alternatively, it is permissible to test the air barrier of the entire building according to Section C402.5.1.2, provided that the tested air leakage rate does not exceed the rate specified in Section C402.5.1.2.

C402.5.2 Reserved.

C402.5.3 Rooms containing fuel-burning appliances. Where combustion air is supplied through openings in an exterior wall to a room or space containing a space conditioning fuel-burning appliance, one of the following shall apply:

1. The room or space containing the appliance shall be located outside of the building thermal envelope.
2. The room or space containing the appliance shall be enclosed and isolated from conditioned spaces inside the building thermal envelope. Such rooms shall comply with all of the following:
   - 2.1. The walls, floor and ceiling that separate the enclosed room or space from the conditioned spaces shall be insulated to be at least equivalent to the insulation requirement of below grade walls as specified in Table C402.1.3 or C402.1.4.
   - 2.2. The walls, floors and ceiling that separate the enclosed room or space from conditioned spaces shall be sealed in accordance with Section C402.5.1.1
   - 2.3. The doors into the enclosed room or space shall be fully gasketed.
   - 2.4. Water lines and ducts in the enclosed room or space shall be insulated in accordance with Section C403.
   - 2.5. Where the air duct supplying combustion air to the enclosed room or space passes through conditioned space, the duct shall be insulated to an *R*-value of not less than R-8.

Exception: Fireplaces and stoves complying with Sections 901 through 905 of the *International Mechanical Code,* and Section 2111.13 of the *International Building Code.*

C402.5.4 Doors and access openings to shafts, chutes, stairways, and elevator lobbies. Doors and access openings from conditioned space to shafts, chutes, stairways and elevator lobbies shall be gasketed, weatherstripped or sealed.

Exceptions:

1. Door openings required to comply with Section 716 of the *International Building Code.*
2. Doors and door openings required to comply with UL 1784 by the *International Building Code.*

C402.5.5 Air intakes, exhaust openings, stairways and shafts. Stairway enclosures, elevator shaft vents and other outdoor air intake and exhaust openings integral to the building envelope shall be provided with dampers in accordance with Section C403.7.9.

C402.5.6 Loading dock weatherseals. Cargo door openings and loading dock door openings shall be equipped with weatherseals that restrict infiltration and provide direct contact along the top and sides of vehicles that are parked in the doorway.

C402.5.7 Vestibules. All building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors. For the purposes of this section, "building entrances" shall include exit-only doors in buildings where separate doors for entering and exiting are provided.

Interior and exterior doors shall have a minimum distance between them of not less than 7 feet. The exterior envelope of conditioned vestibules shall comply with the requirements for a conditioned space. Either the interior or exterior envelope of unconditioned vestibules shall comply with the requirements for a conditioned space. The building lobby is not considered a vestibule.

Exception: Vestibules are not required for the following:

1. Doors not intended to be used as building entrances.
2. Unfinished ground-level space greater than 3,000 square feet (298 m^2) if a note is included on the permit documents at each exterior entrance to the space stating "Vestibule required at time of tenant build-out if entrance serves a space greater than 3,000 square feet in area."
3. Doors opening directly from a *sleeping unit* or dwelling unit.
4. Doors between an enclosed space smaller than 3,000 square feet (298 m^2) in area and the exterior of the building or the building entrance lobby, where those doors do not comprise one of the primary building entrance paths to the remainder of the building. The space must be enclosed and separated without transfer air paths from the primary building entrance paths. If there are doors between the space and the primary entrance path then the doors shall be equipped with self-closing devices so the space acts as a vestibule for the primary building entrance.
5. Revolving doors.
6. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.
7. In buildings less than three stories above grade or in spaces that do not directly connect with the building elevator lobby, doors that have an air curtain with a velocity of not less than 6.56 feet per second (2 m/s) at the floor that have been tested in accordance with ANSI/AMCA 220 and installed in accordance with the manufacturer's instructions. *Manual* or *automatic* controls shall be provided that will operate the air curtain with the opening and closing of the door. Air curtains and their controls shall comply with Section C408.2.3.
8. Building entrances in buildings that are less than four stories above grade and less than 10,000 square feet in area.
9. Elevator doors in parking garages provided that the elevators have an enclosed lobby at each level of the garage.
10. Entrances to semi-heated spaces.
11. Doors that are used only to access outdoor seating areas that are separated from adjacent walking areas by a fence or other barrier.

SDCI Informative Note: *Building entrance* is defined as the means ordinarily used to gain access to the building. Doors other than *building entrances*, such as those leading to service areas, mechanical rooms, electrical equipment rooms, outdoor seating areas or exits from fire stairways, are not covered by this requirement. There is less traffic through these doors, and the vestibule may limit access for large equipment. Note that enclosed lobbies in parking garages also serve to reduce the flow of vehicle exhaust into the building.

C402.5.8 Recessed lighting. Recessed luminaires installed in the *building thermal envelope* shall be all of the following:

1. IC Rated.
2. *Labeled* as having an air leakage rate of not more than 2.0 cfm (0.944 L/s) when tested in accordance with ASTM E 283 at a 1.57 psf (75 Pa) pressure differential.

3. Sealed with a gasket or caulk between the housing and interior wall or ceiling covering.

SECTION C403
MECHANICAL SYSTEMS

C403.1 General. Mechanical systems and equipment serving heating, cooling, ventilating, and other needs shall comply with this section.

Exceptions:

1. Energy using equipment used by a manufacturing, industrial or commercial process other than for conditioning spaces or maintaining comfort and amenities for the occupants and not otherwise regulated by C403.3.2, Tables C403.3.2(1) through (12) inclusive, C403.7.7, C403.9.2.1, C403.10.3, C403.11.2, C403.11.3, C404.2, Table C404.2, C405.8, and C410. Data center and computer room HVAC equipment is not covered by this exception.
2. *Data center systems* are exempt from Sections C403.4 and C403.5.

C403.1.1 HVAC total system performance ratio *(HVAC TSPR)*. For systems serving office, medical office, retail, library and education occupancies and buildings, and the *dwelling units* and residential common areas within R-2 multifamily buildings, which are subject to the requirements of Section C403.3.5 without exceptions, the *HVAC total system performance ratio (HVAC TSPR)* of the *proposed design* HVAC system shall be more than or equal to the *HVAC TSPR* of the *standard reference design* as calculated according to Appendix D, Calculation of HVAC Total System Performance Ratio.

Exceptions:

1. Buildings with *conditioned floor area* less than 5,000 square feet.
2. HVAC systems using district heating water, chilled water or steam.
3. HVAC systems not included in Table D601.11.1.
4. HVAC systems with chilled water supplied by absorption chillers, heat recovery chillers, water to water heat pumps, air to water heat pumps, or a combination of air and water cooled chillers on the same chilled water loop with no more than 10 percent of the cooling capacity of the combination being supplied by air cooled chillers.
5. HVAC system served by heating water plants that include air to water or water to water heat pumps.
6. Underfloor air distribution HVAC systems.
7. Space conditioning systems that do not include mechanical cooling.
8. Alterations to existing buildings that do not substantially replace the entire HVAC system.
9. HVAC systems meeting all the requirements of the standard reference design HVAC system in Table D602.11, Standard Reference Design HVAC Systems.
10. HVAC systems serving laundry rooms, elevator rooms, mechanical rooms, electrical rooms, *data centers*, *computer rooms*, and kitchens.
11. Buildings or areas of medical office buildings that comply fully with ASHRAE Standard 170, including but not limited to surgical centers, or that are required by other applicable codes or standards to provide 24/7 air handling unit operation.

C403.1.2 Calculation of heating and cooling loads. Design loads associated with heating, ventilating and air conditioning of the building shall be determined in accordance with the procedures described in ANSI/ASHRAE/ACCA Standard 183 or by an approved equivalent computational procedure, using the design parameters specified in Chapter 3. Heating and cooling loads shall be adjusted to account for load reductions that are achieved where energy recovery systems are utilized in the HVAC system in accordance with the ASHRAE *HVAC Systems and Equipment Handbook* by an approved equivalent computational procedure.

C403.1.3 Data centers. *Data center systems* shall comply with Sections 6 and 8 of ASHRAE Standard 90.4 (2019). ((~~, with the following changes:~~

~~1. Replace design MLC in ASHRAE Standard 90.4 Table 6.2.1.1 "Maximum Design Mechanical Load Component (Design MLC)" with the following per applicable climate zone:~~

~~Zone 4C Design MLC = 0.22~~ ~~Zone 5B Design MLC = 0.24~~

~~2. Replace annualized MLC values of Table 6.2.1.2 "Maximum Annualized Mechanical Load Component (Annualized MLC)" in ASHRAE Standard 90.4 with the following per applicable climate zone:~~

~~Zone 4C Annual MLC = 0.18~~ ~~Zone 5B Annual MLC = 0.17~~))

C403.1.4 Use of electric resistance and fossil fuel–fired HVAC heating equipment. HVAC heating energy shall not be provided by electric resistance or fossil fuel combustion appliances. For the purposes of this section, electric resistance HVAC heating appliances include but are not limited to electric baseboard, electric resistance fan coil and VAV electric resis-

tance terminal reheat units and electric resistance boilers. For the purposes of this section, fossil fuel combustion HVAC heating appliances include but are not limited to appliances burning natural gas, heating oil, propane, or other fossil fuels.

Exceptions:

1. **Effective date.** Permits applied for prior to June 1, 2021.
1. **Low heating capacity.** Buildings or areas of buildings, other than *dwelling units* or sleeping units, that meet the interior temperature requirements of IBC Chapter 12 with a total installed HVAC heating capacity no greater than 8.5 BTU/h (2.5 watts) per square foot of *conditioned space* are permitted to be heated using electric resistance appliances. For the purposes of this exception, overhead or wall-mounted radiant heating panels installed in an unheated or semi-heated space, insulated in compliance with Section C402.2.8 and controlled by occupant sensing devices in compliance with Section C403.11.1 need not be included as part of the HVAC heating energy calculation.
2. **Dwelling and sleeping units.** Dwelling or sleeping units having an installed HVAC heating capacity no greater than 750 watts in any separate habitable room with exterior fenestration are permitted to be heated using electric resistance appliances.
   a. **Corner rooms.** A room within a dwelling or sleeping unit that has two primary walls facing different cardinal directions, each with exterior fenestration, is permitted to have an installed HVAC heating capacity no greater than 1000 watts. Bay windows and other minor offsets are not considered primary walls.
3. **Small buildings.** Buildings with less than 2,500 square feet of *conditioned floor area* are permitted to be heated using electric resistance appliances.
4. **Defrost.** Heat pumps are permitted to utilize electric resistance as the first stage of heating when a heat pump defrost cycle is required and is in operation.
5. **Air-to-air heat pumps.** Buildings are permitted to utilize internal electric resistance heaters to supplement heat pump heating for air-to-air heat pumps that meet all of the following conditions:
   a. Internal electric resistance heaters have controls that prevent supplemental heater operation when the heating load can be met by the heat pump alone during both steady-state operation and setback recovery.
   b. The heat pump controls are configured to use the compressor as the first stage of heating down to an outdoor air temperature of 17°F or lower.
   c. The heat pump complies with one of the following:
      1. Controlled by a digital or electronic thermostat designed for heat pump use that energizes the supplemental heat only when the heat pump has insufficient capacity to maintain set point or to warm up the space at a sufficient rate,
      2. Controlled by a multistage space thermostat and an outdoor air thermostat wired to energize supplemental heat only on the last stage of the space thermostat and when outdoor air temperature is less than 32°F.
      3. The minimum efficiency of the heat pump is regulated by NAECA, its rating meets the requirements shown in Table C403.3.2(2), and its rating includes all usage of internal electric resistance heating.
   d. The heat pump rated heating capacity is sized to meet the heating load at an outdoor air temperature of 32°F or lower and has a rated heating capacity at 47°F no less than 2 times greater than supplemental internal electric resistance heating capacity, or utilizes the smallest available factory-available internal electric resistance heater.
6. **Air-to-water heat pumps, up to 2,000 MBH.** Buildings are permitted to utilize electric resistance auxiliary heating to supplement heat pump heating for hydronic heating systems that have air-to-water heat pump heating capacity no greater than 2000 kBTU/hr at 47°F, and that meet all of the following conditions:
   a. Controls for the auxiliary electric resistance heating are configured to lock out the supplemental heat when the outside air temperature is above 32°F, unless the hot water supply temperature setpoint to the building heat coils cannot be maintained for 20 minutes.
   b. The heat pump controls are configured to use the compressor as the first stage of heating down to an outdoor air temperature of 17°F or lower except during startup or defrost operation.
   c. The heat pump rated heating capacity at 47°F is no less than 2 times greater than supplemental electric resistance heating capacity.
7. **Air-to-water heat pumps, up to 3,000 MBH.** Buildings are permitted to utilize electric resistance auxiliary heating to supplement heat pump heating for hydronic heating systems that have air-to-water heat pump heating capacity greater than 2000 KBTU/hr and no greater than 3000 kBTU/hr at 47°F, and that meet all of the following conditions:

a. Controls for the auxiliary electric resistance heating are configured to lock out the supplemental heat when the outside air temperature is above 36°F, unless the hot water supply temperature setpoint to the building heat coils cannot be maintained for 20 minutes.

b. The heat pump controls are configured to use the compressor as the first stage of heating down to an outdoor air temperature of 17°F or lower except during startup or defrost operation.

c. The heat pump rated heating capacity at 47°F is no less than 1.75 times greater than supplemental electric resistance heating capacity.

8. **Air-to-water heat pumps, over 3,000 MBH.** Buildings are permitted to utilize electric resistance auxiliary heating to supplement heat pump heating for hydronic heating systems that have air-to-water heat pump heating capacity greater than 3000 kBTU/hr at 47°F and that meet all of the following conditions:

a. Controls for the auxiliary resistance heating are configured to lock out the supplemental heat when the outside air temperature is above 40°F unless the hot water supply temperature setpoint to the building heat coils cannot be maintained for 20 minutes.

b. The heat pump controls are configured to use the compressor as the first stage of heating down to an outdoor air temperature of 17°F or lower except during startup or defrost operation.

c. The heat pump rated heating capacity at 47°F is no less than 1.5 times greater than supplemental electric resistance heating capacity.

9. **Ground source heat pumps.** Buildings are permitted to utilize electric resistance auxiliary heating to supplement heat pump heating for hydronic heating systems with ground source heat pump equipment that meets all of the following conditions:

a. Controls for the auxiliary resistance heating are configured to lock out the supplemental heat when the outdoor air temperature is above 32°F, unless the hot water supply temperature setpoint to the building heat coils cannot be maintained for 20 minutes.

b. The heat pump controls are configured to use the compressor as the first stage of heating down to an outdoor temperature of 17°F or lower.

c. The heat pump rated heating capacity at 32°F entering water conditions is no less than 2 times greater than supplemental electric resistance heating capacity.

10. **Small systems.** Buildings in which electric resistance or fossil fuel appliances, including decorative appliances, either provide less than 5 percent of the total building HVAC system heating capacity or serve less than 5 percent of the *conditioned floor area.*

11. **Specific conditions.** Portions of buildings that require fossil fuel or electric resistance space heating for specific conditions *approved* by the *code official* for research, health care, process or other specific needs that cannot practicably be served by heat pump or other space heating systems. This does not constitute a blanket exception for any occupancy type.

12. **Kitchen exhaust.** Make-up air for commercial kitchen exhaust systems required to be tempered by Section 508.1.1 of the International Mechanical Code is permitted to be heated using electric resistance appliances.

13. **District energy.** Steam or hot water district energy systems that utilize fossil fuels as their primary source of heat energy, that serve multiple buildings, and that were already in existence prior to the effective date of this code, including more energy-efficient upgrades to such existing systems, are permitted to serve as the primary heating energy source.

14. **Heat tape.** Heat tape is permitted where it protects water-filled equipment and piping located outside of the *building thermal envelope*, provided that it is configured and controlled to be automatically turned off when the outside air temperature is above 40°F.

15. **Temporary systems.** Temporary electric resistance heating systems are permitted where serving future tenant spaces that are unfinished and unoccupied, provided that the heating equipment is sized and controlled to achieve interior space temperatures no higher than 40°F.

16. **Emergency generators.** Emergency generators are permitted to use fossil fuels.

17. **Pasteurization.** Electric resistance heat controls are permitted to reset the supply water temperature of hydronic heating systems that serve service water heating heat exchangers during pasteurization cycles of the service hot water storage volume. The hydronic heating system supply water temperature shall be configured to be 145°F or lower during the pasteurization cycle.

C403.2 System design. Mechanical systems shall be designed to comply with Sections C403.2.1 and C403.2.2. Where elements of a building's mechanical systems are addressed in Sections C403.3 through C403.13, such elements shall comply with the applicable provisions of those sections.

C403.2.1 Zone isolation required. HVAC systems serving ((~~*zones*~~)) areas that are intended to operate or be occupied nonsimultaneously shall be divided into isolation areas. *Zones* may be grouped into a single isolation area provided it does not exceed 25,000 square feet (2323 m^2) of *conditioned floor area* nor include more than one floor. Each isolation area shall be equipped with isolation devices and controls configured to automatically shut off the supply of conditioned air and outdoor air to and exhaust air from the isolation area. Each isolation area shall be controlled independently by a device meeting the requirements of Section C403.4.2.2. Central systems and plants shall be provided with controls and devices that will allow system and equipment operation for any length of time while serving only the smallest isolation area served by the system or plant.

Exceptions:

1. Exhaust air and outdoor air connections to isolation areas where the fan system to which they connect is not greater than 5,000 cfm (2360 L/s).
2. Exhaust airflow from a single isolation area of less than 10 percent of the design airflow of the exhaust system to which it connects.
3. Isolation areas intended to operate continuously or intended to be inoperative only when all other isolation areas in a *zone* are inoperative.

C403.2.2 Ventilation and exhaust.

C403.2.2.1 Ventilation. Ventilation, either natural or mechanical, shall be provided in accordance with Chapter 4 of the *International Mechanical Code*. Where mechanical ventilation is provided, the system shall be configured to provide no greater than 150 percent of the minimum outdoor air required by Chapter 4 of the *International Mechanical Code* or other applicable code or standard, whichever is greater.

Exceptions:

1. The mechanical system may supply outdoor air at rates higher than the limit above when it is used for particulate or VOC dilution, economizer, night flushing, dehumidification, pressurization, exhaust make-up, or other process air delivery. Outdoor air shall be reduced to the minimum ventilation rates when not required for the preceding uses.
2. Air systems supplying Group R-1, R-2 or I-2 occupancies.
3. Alterations that replace less than half of the total heating and cooling capacity of the system.
4. Systems with energy recovery complying with the requirements of Section C403.7.6.1 that utilize sensible only active chilled beams for space cooling without any additional zonal fan power. Active chilled beams shall be permitted to utilize the increased outdoor airflow to increase space sensible capacity and to maintain space latent cooling loads without additional controls to reduce the outdoor airflow to each *zone*.

C403.2.2.2 Exhaust. Exhaust shall be provided in accordance with Chapters 4 and 5 of the *International Mechanical Code*. Where exhaust is provided, the system shall be configured to provide no greater than 150 percent of the minimum exhaust air required by Chapters 4 and 5 of the *International Mechanical Code* or other applicable code or standard, whichever is greater.

Exceptions:

1. The mechanical system may exhaust air at rates higher than the limit above when it is used for particulate or VOC dilution, economizer, night flushing, dehumidification, pressure equalization, relief, or other process exhaust air requirements. Outdoor air and exhaust air shall be reduced to the minimum exhaust rates when not required for the preceding uses.
2. Domestic range hood exhaust in Group R occupancies.
3. Exhaust for Group I occupancies.

C403.2.3 Variable flow capacity. For fan and pump motors ((~~7.5~~)) 5 hp and greater including motors in or serving custom and packaged air handlers serving variable air volume fan systems, constant volume fans, parking garage ventilation fans, heating and cooling hydronic pumping systems, pool and service water pumping systems, domestic water pressure-booster systems, cooling tower fan, and other pump or fan motors where variable flows are required, there shall be:

1. Variable speed drives; or
2. Other controls and devices that will result in fan and pump motor demand of no more than 30 percent of design wattage at 50 percent of design air volume for fans when static pressure set point equals 1/3 the total design static pressure, and 50 percent of design water flow for pumps, based on manufacturer's certified test data. Variable inlet vanes, throttling valves (dampers), scroll dampers or bypass circuits shall not be allowed.

   Exception: Variable speed devices are not required for motors that serve:

   1. Fans or pumps in packaged equipment where variable speed drives are not available as a factory option from the equipment manufacturer.

2. Fans or pumps that are required to operate only for emergency fire-life-safety events (e.g., stairwell pressurization fans, elevator pressurization fans, fire pumps, etc.).

C403.3 Equipment selection. Heating and cooling equipment installed in mechanical systems shall be sized in accordance with Section C403.3.1 and shall be not less efficient in the use of energy than as specified in Section C403.3.2.

C403.3.1 Equipment and system sizing. The output capacity of heating and cooling equipment shall be not greater than that of the smallest available equipment size that exceeds the loads calculated in accordance with Section C403.1.2. A single piece of equipment providing both heating and cooling shall satisfy this provision for one function with the capacity for the other function as small as possible, within available equipment options.

Exceptions:

1. Required standby equipment and systems provided with controls and devices that allow such systems or equipment to operate automatically only when the primary equipment is not operating.
2. Multiple units of the same equipment type with combined capacities exceeding the design load and provided with controls that are configured to sequence the operation of each unit based on load.

C403.3.2 HVAC equipment performance requirements. Equipment shall meet the minimum efficiency requirements of Tables C403.3.2(1) through ((~~C403.3.2(12)~~)) C403.3.2(13) when tested and rated in accordance with the applicable test procedure. Plate-type liquid-to-liquid heat exchangers shall meet the minimum requirements of Table C403.3.2(10). The efficiency shall be verified through certification and listed under an *approved* certification program or, if no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the manufacturer. Where multiple rating conditions or performance requirements are provided, the equipment shall satisfy all stated requirements. Where components, such as indoor or outdoor coils, from different manufacturers are used, calculations and supporting data shall be furnished by the designer that demonstrates that the combined efficiency of the specified components meets the requirements herein.

Gas-fired and oil-fired forced air furnaces with input ratings of 225,000 Btu/h (65 kW) or greater and all unit heaters shall also have an intermittent ignition or interrupted device (IID), and have either mechanical draft (including power venting) or a flue damper. A vent damper is an acceptable alternative to a flue damper for furnaces where combustion air is drawn from the conditioned space. All furnaces with input ratings of 225,000 Btu/h (65 kW) or greater, including electric furnaces, that are not located within the conditioned space shall have jacket losses not exceeding 0.75 percent of the input rating.

Air-to-water heat pump manufacturers shall report the hourly heating output or heating efficiency with and without defrost operation at 32°F, in addition to meeting the efficiency requirements of Table C403.3.2(13) at the AHRI 550/590 applicable leaving water temperatures. The hourly heating output or heating efficiency with and without defrost operation shall be documented on the mechanical permit drawings.

Exception: Heat recovery chillers and air-to-water heat pumps covered under Table C403.3.2(13), are not required to be listed in the AHRI certification program for AHRI 550/590. The equipment heating and cooling efficiency ratings shall be supported by data furnished by the manufacturer at AHRI 550/590 conditions. Where multiple rating conditions or performance requirements are provided, the equipment shall satisfy all stated requirements.

SDCI Informative Note: Table C403.3.2.(13) is from ASHRAE 90.1-2019. At the time of the adoption of the 2018 SEC there were no air-to-water heat pumps or heat recovery chillers listed in the AHRI Certified Product Directory: https://www.ahridirectory.org. According to AHRI 550/590 Section 5.3, "Full and part-load application ratings shall include the range of Rating Conditions listed in Table 2 or be within the operating limits of the equipment."

C403.3.2.1 Chillers. Chilled water plants and buildings with more than 500 tons total capacity shall not have more than 100 tons provided by air-cooled chillers.

Exceptions:

1. Where the designer demonstrates that the water quality at the building site fails to meet manufacturer's specifications for the use of water-cooled equipment.
2. Air-cooled chillers with minimum efficiencies at least 10 percent higher than those listed in Table C403.3.2(7).
3. Replacement of existing air-cooled chiller equipment.
4. Air-to-water heat pump units that are configured to provide both heating and cooling and that are rated in accordance with AHRI 550/590. ((~~Where the air-to-water heat pumps are designed for a maximum supply leaving water temperature of less than 140°F, the efficiency rating will be calculated and reported at the maximum unit leaving water temperature for this test condition.~~))

TABLE C403.3.2(1)A (continued)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
Air conditioners, evaporatively cooled	< 65,000 Btu/h[b]	All	Split System and Single Package	12.1 EER 12.3 IEER	AHRI 210/240
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.1 EER 12.3 IEER	AHRI 340/360
		All other	Split System and Single Package	11.9 EER 12.1 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.0 EER 12.2 IEER	
		All other	Split System and Single Package	11.8 EER 12.0 IEER	
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.9 EER 12.1 IEER	
		All other	Split System and Single Package	11.7 EER 11.9 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.7 EER 11.9 IEER	
		All other	Split System and Single Package	11.5 EER 11.7 IEER	
Condensing units, air cooled	≥ 135,000 Btu/h			10.5 EER 11.8 IEER	AHRI 365
Condensing units, water cooled	≥ 135,000 Btu/h			13.5 EER 14.0 IEER	
Condensing units, evaporatively cooled	≥ 135,000 Btu/h			13.5 EER 14.0 IEER	

For SI: 1 British thermal unit per hour = 0.2931 W.

a. Chapter 12 of the referenced standard contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

b. Single-phase, air-cooled air conditioners less than 65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

TABLE C403.3.2(1)B
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED VARIABLE REFRIGERANT FLOW AIR CONDITIONERS

Equipment Type	Size Category	Heating Section Type	Sub-Category or Rating Condition	Minimum Efficiency	Test Procedure[a]
VRF Air Conditioners, Air Cooled	< 65,000 Btu/h	All	VRF Multi-split System	13.0 SEER	AHRI 1230
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	VRF Multi-split System	11.2 EER 15.5 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	VRF Multi-split System	11.0 EER 14.9 IEER	
	≥ 240,000 Btu/h	Electric Resistance (or None)	VRF Multi-split System	10.0 EER ((~~13.9 EER~~)) 13.9 IEER	

TABLE C403.3.2(7)
MINIMUM EFFICIENCY REQUIREMENTS: WATER CHILLING PACKAGES[a, b]

EQUIPMENT TYPE	SIZE CATEGORY	UNITS	PATH A		PATH B		TEST PROCEDURE[c]
			FULL LOAD	IPLV	FULL LOAD	IPLV	
Air-cooled chillers	< 150 tons	EER	≥ 10.100	≥ 13.700	≥ 9.700	≥ 15.800	AHRI 550/590
	≥ 150 tons	EER	≥ 10.100	≥ 14.000	≥ 9.700	≥ 16.100	
Air cooled without condenser, electrical operated	All capacities	EER	Air-cooled chillers without condensers shall be rated with matching condensers and comply with the air-cooled chiller efficiency requirements.				
Water cooled, electrically operated, positive displacement	< 75 tons	kW/ton	≤ 0.750	≤ 0.600	≤ 0.780	≤ 0.500	
	≥ 75 tons and < 150 tons	kW/ton	≤ 0.720	≤ 0.560	≤ 0.750	≤ 0.490	
	≥ 150 tons and < 300 tons	kW/ton	≤ 0.660	≤ 0.540	≤ 0.680	≤ 0.440	
	≥ 300 tons and < 600 tons	kW/ton	≤ 0.610	≤ 0.520	≤ 0.625	≤ 0.410	
	≥ 600 tons	kW/ton	≤ 0.560	≤ 0.500	≤ 0.585	≤ 0.380	
Water cooled, electrically operated, centrifugal	< 150 tons	kW/ton	≤ 0.610	≤ 0.550	≤ 0.695	≤ 0.440	
	≥ 150 tons and < 300 tons	kW/ton	≤ 0.610	≤ 0.550	≤ 0.695	≤ 0.400	
	≥ 300 tons and < 400 tons	kW/ton	≤ 0.560	≤ 0.520	≤ 0.595	≤ 0.390	
	≥ 400 tons	kW/ton	≤ 0.560	≤ 0.500	≤ 0.585	≤ 0.380	
Air cooled, absorption single effect	All capacities	COP	≥ 0.600	NR	NA	NA	AHRI 560
Water cooled, absorption single effect	All capacities	COP	≥ 0.700	NR	NA	NA	
Absorption double effect, indirect fired	All capacities	COP	≥ 1.000	≥ 1.050	NA	NA	
Absorption double effect, direct fired	All capacities	COP	≥ 1.000	≥ 1.000	NA	NA	

Keys for Table C403.2.3(7)

For SI: 1 ton = 3517 W, 1 British thermal unit per hour = 0.2931 W, °C = [(°F) - 32]/1.8.

NA = Not applicable, not to be used for compliance; NR = No requirement.

Footnotes for Table C403.2.3(7)

((~~a. The centrifugal chiller equipment requirements, after adjustment in accordance with Section C403.3.2.2 or Section C403.3.2.3, do not apply to chillers used in low-temperature applications where the design leaving fluid temperature is less than 36ºF. The requirements do not apply to positive displacement chillers with leaving fluid temperatures less than or equal to 32ºF. The requirements do not apply to absorption chillers with design leaving fluid temperatures less than 40ºF.~~))

a. The requirements for air-cooled, water-cooled positive displacement, and absorption chillers are at standard rating conditions defined in the reference test procedure. The requirements for centrifugal chillers shall be adjusted for nonstandard rating conditions per Section C403.2.3.1 and are only applicable for the range of conditions listed there.

b. Compliance with this standard can be obtained by meeting the minimum requirements of Path A or B. However, both the full load and IPLV shall be met to fulfill the requirements of Path A or B.

c. Chapter 12 of the referenced standard contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

TABLE C403.3.2(13)[f, g, h, i]
HEAT PUMP AND HEAT RECOVERY CHILLER PACKAGES—MINIMUM EFFICIENCY REQUIREMENTS

Equipment Type	Size Category (ton_R)	Cooling only Operation Cooling Efficiency[a] (Air EER FL/IPLV-Btu/W-h) Water Source Power Input per Capacity FL/IPLV-(kW/ton_R)		Heating Operation: Heating Source Conditions (Entering/ leaving water) or OAT (db/wb) °F	Heat Pump Heating Full Load Efficiency (COP_H)[b], (W/W) — Leaving Heating Water Temperature				Heat Recovery Chiller Full Load Efficiency: Full Load Efficiency (COP_{HR})[b, c], (W/W); Simultaneous Cooling and Heating Full Load Efficiency (COP_{SHC})[b], (W/W) — Leaving Heating Water Temperature				Test Procedure
					Low	Medium	High	Boost	Low	Medium	High	Boost	
		Path A	Path B		105°F	120°F	140°F	140°F	105°F	120°F	140°F	140°F	
Air Source	All sizes	≥ 9.595 FL ≥ 13.02 IPLV.IP	≥ 9.215 FL ≥ 15.01 IPLV.IP	47 db 43 wb[d]	≥ 3.290	≥ 2.770	≥ 2.310	NA	NA	NA	NA	NA	AHRI 550/590
		≥ 9.595 FL ≥ 13.30 IPLV.IP	≥ 9.215 FL ≥ 15.30 IPLV.IP	17 db 15 wb[d]	≥ 2.230	≥ 1.950	≥ 1.630	NA	NA	NA	NA	NA	
Water source electrically operated positive displacement	< 75	≤ 0.7885 FL ≤ 0.6316 IPLV.IP	≤ 0.7875 FL ≤ 0.5145 IPLV.IP	54/44[e]	≥ 4.640	≥ 3.680	≥ 2.680	NA	≥ 8.330	≥ 6.410	≥ 4.420	NA	AHRI 550/590
				75/65[e]	NA	NA	NA	≥ 3.550	NA	NA	NA	6.150	
	≥ 75 and <150	≤ 0.7579 FL ≤ 0.5895 IPLV.IP	≤ 0.7140 FL ≤ 0.4620 IPLV.IP	54/44[e]	≥ 4.640	≥ 3.680	≥ 2.680	NA	≥ 8.330	≥ 6.410	≥ 4.420	NA	
				75/65[e]	NA	NA	NA	≥ 3.550	NA	NA	NA	6.150	
	≥ 150 and <300	≤ 0.6947 FL ≤ 0.5684 IPLV.IP	≤ 0.7140 FL ≤ 0.4620 IPLV.IP	54/44[e]	≥ 4.640	≥ 3.680	≥ 2.680	NA	≥ 8.330	≥ 6.410	≥ 4.420	NA	
				75/65[e]	NA	NA	NA	≥ 3.550	NA	NA	NA	6.150	
	≥ 300 and <600	≤ 0.6421 FL ≤ 0.5474 IPLV.IP	≤ 0.6563 FL ≤ 0.4305 IPLV.IP	54/44[e]	≥ 4.930	≥ 3.960	≥ 2.970	NA	≥ 8.900	≥ 6.980	≥ 5.000	NA	
				75/65[e]	NA	NA	NA	≥ 3.900	NA	NA	NA	6.850	
	≥ 600	≤ 0.5895 FL ≤ 0.5263 IPLV.IP	≤ 0.6143 FL ≤ 0.3990 IPLV.IP	54/44[e]	≥ 4.930	≥ 3.960	≥ 2.970	NA	≥ 8.900	≥ 6.980	≥ 5.000	NA	
				75/65[e]	NA	NA	NA	≥ 3.900	NA	NA	NA	6.850	
Water source electrically operated centrifugal	< 75	≤ 0.6421 FL ≤ 0.5789 IPLV.IP	≤ 0.7316 FL ≤ 0.4632 IPLV.IP	54/44[e]	≥ 4.640	≥ 3.680	≥ 2.680	NA	≥ 8.330	≥ 6.410	≥ 4.420	NA	AHRI 550/590
				75/65[e]	NA	NA	NA	≥ 3.550	NA	NA	NA	6.150	
	≥ 75 and <150	≤ 0.5895 FL ≤ 0.5474 IPLV.IP	≤ 0.6684 FL ≤ 0.4211 IPLV.IP	54/44[e]	≥ 4.640	≥ 3.680	≥ 2.680	NA	≥ 8.330	≥ 6.410	≥ 4.420	NA	
				75/65[e]	NA	NA	NA	≥ 3.550	NA	NA	NA	6.150	
	≥ 150 and <300	≤ 0.5895 FL ≤ 0.5263 IPLV.IP	≤ 0.6263 FL ≤ 0.4105 IPLV.IP	54/44[e]	≥ 4.640	≥ 3.680	≥ 2.680	NA	≥ 8.330	≥ 6.410	≥ 4.420	NA	
				75/65[e]	NA	NA	NA	≥ 3.550	NA	NA	NA	6.150	
	≥ 300 and <600	≤ 0.5895 FL ≤ 0.5263 IPLV.IP	≤ 0.6158 FL ≤ 0.4000 IPLV.IP	54/44[e]	≥ 4.930	≥ 3.960	≥ 2.970	NA	≥ 8.900	≥ 6.980	≥ 5.000	NA	
				75/65[e]	NA	NA	NA	≥ 3.900	NA	NA	NA	6.850	
	≥ 600	≤ 0.5895 FL ≤ 0.5263 IPLV.IP	≤ 0.6158 FL ≤ 0.4000 IPLV.IP	54/44[e]	≥ 4.930	≥ 3.960	≥ 2.970	NA	≥ 8.900	≥ 6.980	≥ 5.000	NA	
				75/65[e]	NA	NA	NA	≥3.900	NA	NA	NA	6.850	

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Footnotes:

a. Cooling-only rating conditions are standard rating conditions defined in AHRI 550/590, Table 1.

b. Heating full-load rating conditions are at rating conditions defined in AHRI 550/590, Table 1.

c. For water-cooled heat recovery chillers that have capabilities for heat rejection to a heat recovery condenser and a tower condenser, the COP_{HR} applies to operation at full load with 100% heat recovery (no tower rejection). Units that only have capabilities for partial heat recovery shall meet the requirements of Table 6.8.1-3.

d. Outdoor air entering dry-bulb (db) temperature and wet-bulb (wb) temperature.

e. Source-water entering and leaving water temperature.

f. AHRI ratings are not required for equipment sizes larger than those covered by the test standard.

g. Air-to-water heat pumps that are configured to operate only in heating and not in cooling only need to comply with the minimum heating efficiencies.

h. Units that are both an air-to-water heat pump and an heat recovery chiller are required to comply with either the applicable air source efficiency requirements or the heat recovery chiller requirements but not both.

i. Heat pumps and heat recovery chillers are only required to comply with one of the four leaving heating water temperature criteria. The leaving heater water temperature criteria that is closest to the design leaving water temperature shall be utilized.

C403.3.2.2 Water-cooled centrifugal chilling package. Equipment not designed for operation at AHRI Standard 550/590 test conditions of 44°F (7°C) leaving chilled-water temperature and 2.4 gpm/ton evaporator fluid flow and 85°F (29°C) entering condenser water temperature with 3 gpm/ton (0.054 L/s × kW) condenser water flow shall have maximum full-load kW/ton (FL) and part-load ratings adjusted using Equations 4-7 and 4-8.

Exception: Centrifugal chillers designed to operate outside of these temperature ranges are not regulated by this section.

$FL_{adj} = FL/K_{adj}$ **(Equation 4-7)**

$PLV_{adj} = IPLV/K_{adj}$ **(Equation 4-8)**

Where:

K_{adj}	=	A × B
FL	=	Full-load kW/ton values as specified in Table C403.3.2(7)
FL_{adj}	=	Maximum full-load kW/ton rating, adjusted for nonstandard conditions
IPLV	=	Values as specified in Table C403.3.2(7)
PLV_{adj}	=	Maximum NPLV rating, adjusted for nonstandard conditions.
A	=	$0.00000014592 \times (LIFT)^4 - 0.0000346496 \times (LIFT)^3 + 0.00314196 \times (LIFT)^2\ 0.147199 \times LIFT + 3.9302$
B	=	$0.0015 \times L_{vg}^{Evap}$ (°F) + 0.934
LIFT	=	$L_{vg}Cond - L_{vg}Evap$
L_{vg}^{Cond}	=	Full-load condenser leaving fluid temperature (°F)
L_{vg}^{Evap}	=	Full-load evaporator leaving temperature (°F)

The FLadj and PLVadj values are only applicable for centrifugal chillers meeting all of the following full-load design ranges:

1. Minimum evaporator leaving temperature: 36°F.
2. Maximum condenser leaving temperature: 115°F.
3. LIFT is not less than 20°F and not greater than 80°F.

C403.3.2.3 Positive displacement (air- and water-cooled) chilling package. Equipment with a leaving fluid temperature higher than 32°F (0°C) and water-cooled positive displacement chilling packages with a condenser leaving fluid temperature below 115°F (46°C) shall meet the requirements of Table C403.3.2(7) when tested or certified with water at standard rating conditions, in accordance with the referenced test procedure.

C403.3.2.4 Packaged and split system electric heating and cooling equipment. Packaged and split system electric equipment providing both heating and cooling, and cooling-only equipment with electric heat in the main supply duct before VAV boxes, in each case with a total cooling capacity greater than 6,000 Btu/h shall be a heat pump.

Exception: Unstaffed equipment shelters or cabinets used solely for personal wireless service facilities.

C403.3.2.5 Humidification. If an air economizer is required on a cooling system for which humidification equipment is to be provided to maintain minimum indoor humidity levels, then the humidifier shall be of the adiabatic type (direct evaporative media or fog atomization type).

Exceptions:

1. Health care facilities licensed by the state where Chapter 246-320 or 246-330 WAC requires steam injection humidifiers in duct work downstream of final filters.
2. Systems with water economizer.
3. 100% outside air systems with no provisions for air recirculation to the central supply fan.
4. Nonadiabatic humidifiers cumulatively serving no more than 10% of a building's air economizer capacity as measured in cfm. This refers to the system cfm serving rooms with stand-alone or duct mounted humidifiers.

C403.3.3 Hot gas bypass limitation. Cooling systems shall not use hot gas bypass or other evaporator pressure control systems unless the system is designed with multiple steps of unloading or continuous capacity modulation. The capacity of the hot gas bypass shall be limited as indicated in Table C403.3.3, as limited by Section C403.5.1.

TABLE C403.3.3
MAXIMUM HOT GAS BYPASS CAPACITY

RATED CAPACITY	MAXIMUM HOT GAS BYPASS CAPACITY (% of total capacity)
≤ 240,000 Btu/h	50
> 240,000 Btu/h	25

For SI: 1 British thermal unit per hour = 0.2931 W.

C403.3.4 Boiler turndown. *Boiler systems* with design input of greater than 1,000,000 Btu/h (293 kW) shall comply with the turndown ratio specified in Table C403.3.4.

The system turndown requirement shall be met through the use of multiple single input boilers, one or more *modulating boilers* or a combination of single input and modulating boilers.

TABLE C403.3.4
BOILER TURNDOWN

Boiler System Design Input (Btu/h)	Minimum Turndown Ratio
≥ 1,000,000 and less than or equal to 5,000,000	3 to 1
> 5,000,000 and less than or equal to 10,000,000	4 to 1
> 10,000,000	5 to 1

C403.3.5 Dedicated outdoor air systems (DOAS). For buildings with occupancies as shown in Table C403.3.5, outdoor air shall be provided to each occupied space by a dedicated outdoor air system (DOAS) which delivers 100 percent outdoor air without requiring operation of the heating and cooling system fans for ventilation air delivery.

Exceptions:

1. Occupied spaces that are not ventilated by a mechanical ventilation system and are only ventilated by a natural ventilation system in accordance with Section 402 of the *International Mechanical Code.*
2. High efficiency variable air volume (VAV) systems complying with Section C403.6.10 for occupancy classifications other than Groups A-1, A-2 and A-3 as specified in Table C403.3.5, and high efficiency VAV systems complying with Section C403.12 for occupancy classifications Groups A-1, A-2 and A-3 as specified in Table C403.3.5. This exception shall not be used as a substitution for a DOAS per Section C406.6.
3. Spaces that are within building types not subject to the requirements of Section C403.3.5, and that qualify as accessory occupancies according to Section 508.2 of the International Building Code, are not required to comply with this section.

TABLE C403.3.5
OCCUPANCY CLASSIFICATIONS REQUIRING DOAS

Occupancy Classification[a]	Inclusions	Exempted
A-1	All occupancies not specifically exempted	Television and radio studios
A-2	Casinos (gaming area)	All other A-2 occupancies
A-3	Lecture halls, community halls, exhibition halls, gymnasiums, courtrooms, libraries, places of religious worship	All other A-3 occupancies
A-4, A-5		All occupancies excluded
B	All occupancies not specifically exempted	Food processing establishments including commercial kitchens, restaurants, cafeterias; laboratories for testing and research; data processing facilities and telephone exchanges; air traffic control towers; animal hospitals, kennels, pounds; ambulatory care facilities.
F, H, I, R, S, U		All occupancies excluded
E, M	All occupancies included	

a. Occupancy classification from the *International Building Code* Chapter 3.

C403.3.5.1 Energy recovery ventilation with DOAS. The DOAS shall include *energy recovery ventilation.* The energy recovery system shall have a ((~~60 percent minimum sensible recovery effectiveness or have 50~~)) 60 percent enthalpy recovery effectiveness in accordance with Section C403.7.6. For DOAS having a total fan system motor nameplate hp less than 5 hp, total combined fan power shall not exceed 1 W/cfm of outdoor air. For DOAS having a total fan system motor hp greater than or equal to 5 hp, refer to fan power limitations of Section C403.8.1. This fan power restriction applies to

each dedicated outdoor air unit in the permitted project, but does not include the fan power associated with the zonal heating/cooling equipment. The airflow rate thresholds for energy recovery requirements in Tables C403.7.6(1) and C403.7.6(2) do not apply.

Exceptions:

1. Occupied spaces with all of the following characteristics:
   a. ((~~complying~~)) Complying with Section C403.7.6.1; ((~~,~~))
   b. ((~~served~~)) Served by equipment less than 5000 cfm; ((~~,~~))
   c. ((~~with~~)) With an average occupant load ((~~greater than 25~~)) 15 people or greater per 1000 square feet (93 m^2) of floor area (as established in Table 403.3.1.1 of the *International Mechanical Code*);
   d. ((~~that~~)) That include demand control ventilation configured to reduce outdoor air by at least 50% below design minimum ventilation rates when the actual occupancy of the space served by the system is less than the design occupancy; and
   e. Smaller than 650 square feet.
2. Systems installed for the sole purpose of providing makeup air for systems exhausting toxic, flammable, paint, or corrosive fumes or dust, dryer exhaust, or commercial kitchen hoods used for collecting and removing grease vapors and smoke.
3. The energy recovery systems for R-1 and R-2 occupancies are permitted to provide 60 percent minimum sensible heat recovery effectiveness in lieu of 60 percent enthalpy recovery effectiveness. The return/exhaust air stream temperature for heat recovery device selection shall be 70°F or as determined by an *approved* calculation procedure.

C403.3.5.2 Heating/cooling system fan controls. Heating and cooling equipment fans, heating and cooling circulation pumps, and terminal unit fans shall cycle off and terminal unit primary cooling air shall be shut off when there is no call for heating or cooling in the *zone.*

Exception: Fans used for heating and cooling using less than 0.12 watts per cfm may operate when space temperatures are within the set point dead band (Section C403.4.1.2) to provide destratification and air mixing in the space.

C403.3.5.3 Decoupled DOAS supply air. The DOAS supply air shall be delivered directly to the occupied space or downstream of the terminal heating and/or cooling coils.

Exceptions:

1. Active chilled beam systems.
2. Sensible only cooling terminal units with pressure independent variable airflow regulating devices limiting the DOAS supply air to the greater of latent load or minimum ventilation requirements.
3. Terminal heating and/or cooling units that comply with the low fan power allowance requirements in the exception of Section C403.3.5.2.

C403.3.5.4 Impracticality. Where the *code official* determines that full compliance with all of the requirements of Section C403.3.5.1 and C403.3.5.2 would be impractical, it is permissible to provide an approved alternate means of compliance that achieves a comparable level of energy efficiency. For the purposes of this section, impractical means that an HVAC system complying with Section C403.3.5 cannot effectively be utilized due to an unusual use or configuration of the building.

C403.3.6 Ventilation for Group R-2 occupancy. For all Group R-2 dwelling and sleeping units, a balanced ventilation system with heat recovery system with minimum 60 percent sensible recovery effectiveness shall provide outdoor air directly to all habitable space. The ventilation system shall allow for the design flow rates to be tested and verified at each habitable space as part of the commissioning process in accordance with Section C408.2.2.

SDCI Informative Note: When an H/ERV (heat recovery ventilator or energy recovery ventilator) that is rated and listed in accordance with HVI 920 is used to comply with the "sensible recovery effectiveness" requirement in Section C403.3.6 or C403.7.6 Exception 2, use the product's Adjusted Sensible Recovery Efficiency (ASRE) at 32°F, as listed in the HVI Section 3 H/ERV Directory. Select the ASRE for a flow rate that is no less than the design flow rate, or interpolate between two listed flow rates. HVI refers to the Home Ventilating Institute.

C403.3.7 Hydronic system flow rate. Chilled water and condenser water piping shall be designed such that the design flow rate in each pipe segment shall not exceed the values listed in Table C403.3.7 for the appropriate total annual hours of operation. Pipe sizes for systems that operate under variable flow conditions (e.g., modulating two-way control valves at coils) and that contain variable speed pump motors are permitted to be selected from the "Variable Flow/Variable Speed" columns. All others shall be selected from the "Other" columns.

Exception: Design flow rates exceeding the values in Table C403.3.7 are permitted in specific sections of pipe if the pipe is not in the critical circuit at design conditions and is not predicted to be in the critical circuit during more than 30 percent of operating hours.

SDCI Informative Note: The flow rates listed here do not consider noise or erosion. Lower flow rates are often recommended for noise sensitive locations.

TABLE C403.3.7
PIPING SYSTEM DESIGN MAXIMUM FLOW RATE IN GPM[1]

Pipe Size (in)	≤ 2000 hours/yr		> 2000 and ≤ 4400 hours/year		> 4400 hours/year	
	Other	Variable Flow/Variable Speed	Other	Variable Flow/Variable Speed	Other	Variable Flow/Variable Speed
2-1/2	120	180	85	130	68	110
3	180	270	140	210	110	170
4	350	530	260	400	210	320
5	410	620	310	470	250	370
6	740	1100	570	860	440	680
8	1200	1800	900	1400	700	1100
10	1800	2700	1300	2000	1000	1600
12	2500	3800	1900	2900	1500	2300

1. There are no requirements for pipe sizes smaller than the minimum shown in the table or larger than the maximum shown in the table.

C403.4 HVAC system controls. HVAC systems shall be provided with controls in accordance with Sections C403.4.1 through C403.4.11 and shall be capable of and configured to implement all required control functions in this code.

C403.4.1 Thermostatic controls. The supply of heating and cooling energy to each *zone* shall be controlled by individual thermostatic controls capable of responding to temperature within the *zone*. Controls in the same *zone* or in neighboring *zones* connected by openings larger than 10 percent of the floor area of either *zone* shall not allow for simultaneous heating and cooling. At a minimum, each floor of a building shall be considered as a separate *zone*. Controls on systems required to have economizers and serving single *zones* shall have multiple cooling stage capability and activate the economizer when appropriate as the first stage of cooling. See Section C403.5 for further economizer requirements. Where humidification or dehumidification or both is provided, at least one humidity control device shall be provided for each humidity control system.

Exceptions:

1. Independent perimeter systems that are designed to offset only building envelope heat losses or gains or both serving one or more perimeter *zones* also served by an interior system provided:
   1.1. The perimeter system includes at least one thermostatic control *zone* for each building exposure having exterior walls facing only one orientation (within +/- 45 degrees) (0.8 rad) for more than 50 contiguous feet (15,240 mm);
   1.2. The perimeter system heating and cooling supply is controlled by a thermostat located within the *zones* served by the system; and
   1.3. Controls are configured to prevent the perimeter system from operating in a different heating or cooling mode from the other equipment within the *zones* or from neighboring *zones* connected by openings larger than 10 percent of the floor area of either *zone*.

((~~2. Any interior *zone* open to a perimeter *zone* shall have set points and dead bands coordinated so that cooling in the interior *zone* shall not operate while the perimeter *zone* is in heating until the interior zone temperature is 5°F (2.8°C) higher than the perimeter *zone* temperature, unless the interior and perimeter *zones* are separated by a partition whose permanent openings are smaller than 10 percent of the perimeter *zone* floor area.~~))

2. Where an interior zone and a perimeter zone are open to each other with permanent openings larger than 10 percent of the floor area of either zone, cooling in the interior zone is permitted to operate at times when the perimeter zone is in heating and the interior zone temperature is at least 5°F (2.8°C) higher than the perimeter zone temperature. For the purposes of this exception, a permanent opening is an opening without doors or other operable closures.
3. Dedicated outdoor air units that provide *ventilation air*, make-up air or *replacement air* for exhaust systems are permitted to be controlled based on supply air temperature. The supply air temperature shall be controlled to a maximum of 65°F (18.3°C) in heating and a minimum of 72°F (22°C) in cooling unless the supply air temperature is being reset based on the status of cooling or heating in the *zones* served or it being reset based on outdoor air temperature.

C403.4.1.1 Heat pump supplementary heat control. ((~~Unitary air-cooled heat pumps shall include microprocessor controls that minimize supplemental heat usage during start-up, set-up, and defrost conditions. These controls shall anticipate need for heat and use compression heating as the first stage of heat. Controls shall indicate when supplemental heating is being used through visual means (e.g., LED indicators). Heat pumps equipped with supplementary heaters shall be installed with controls that prevent supplemental heater operation above 40°F (4.4°C).~~)) Heat pumps equipped with internal electric resistance heaters shall have controls that prevent supplemental heater operation when the heating load can be met by the heat pump alone during both steady-state operation and setback recovery. Supplemental heater operation is permitted during outdoor coil defrost cycles. Heat pumps equipped with supplementary heaters shall comply with all conditions of Section C403.1.4.

Exception: ((~~Packaged terminal heat pumps (PTHPs) of less than 2 tons (24,000 Btu/hr) cooling capacity provided with controls that prevent supplementary heater operation above 40°F.~~)) Heat pumps whose minimum efficiency is regulated by NAECA and whose ratings meet the requirements shown in Table C403.3.2(2) and include all usage of internal electric resistance heating.

C403.4.1.2 Dead band. Where used to control both heating and cooling, *zone* thermostatic controls shall be configured to provide a temperature range or dead band of at least 5°F (2.8°C) within which the supply of heating and cooling energy to the *zone* is shut off or reduced to a minimum.

Exceptions:

1. Thermostats requiring manual changeover between heating and cooling modes.
2. Occupancies or applications requiring precision in indoor temperature control as *approved* by the *code official.*

C403.4.1.3 Set point overlap restriction. Where a *zone* has a separate heating and a separate cooling thermostatic control located within the *zone,* a limit switch, mechanical stop or direct digital control system with software programming shall be configured to prevent the heating set point from exceeding the cooling set point and to maintain a dead band in accordance with Section C403.4.1.2.

C403.4.1.4 Heated or cooled vestibules. The heating system for heated vestibules and air curtains with integral heating shall be provided with controls configured to shut off the source of heating when the outdoor air temperature is greater than 45°F (7°C). Vestibule heating and cooling systems shall be controlled by a thermostat located in the vestibule configured to limit heating to a temperature not greater than 60°F (16°C) and cooling to a temperature not less than 85°F (29°C).

Exceptions:

1. Control of heating or cooling provided by transfer air that would otherwise be exhausted.
2. Vestibule heating only systems are permitted to be controlled without an outdoor air temperature lockout when controlled by a thermostat located in the vestibule configured to limit heating to a temperature not greater than 45°F (7°C) where required for freeze protection of piping and sprinkler heads located in the vestibule.

C403.4.1.5 Hot water boiler outdoor temperature setback control. Hot water boilers that supply heat to the building through one- or two-pipe heating systems shall have an outdoor setback control that lowers the boiler water temperature based on the outdoor temperature.

C403.4.1.6 Door switches for HVAC system thermostatic control. Doors that open to the outdoors from a conditioned space must have controls configured to do the following once doors have been open for 5 minutes:

1. Disable the mechanical heating to the *zone* or reset the space heating temperature set point to 55°F or less within 5 minutes of the door open enable signal.
2. Disable the mechanical cooling to the *zone* or reset the space cooling temperature set point to 85°F or more within 5 minutes of the door open enable signal.

Exceptions:

1. Building entrances with vestibules.
2. Alterations to existing buildings.
3. Loading docks.

C403.4.2 Off-hour controls. For all occupancies other than Group R and for *conditioned spaces* other than dwelling units within Group R occupancies, each *zone* shall be provided with thermostatic setback controls that are controlled by either an *automatic* time clock or programmable control system.

Exceptions:

1. *Zones* that will be operated continuously.
2. *Zones* with a full HVAC load demand not exceeding 6,800 Btu/h (2 kW) and having a manual shutoff switch located with *ready access.*

C403.4.2.1 Thermostatic setback. Thermostatic setback controls shall be configured to set back or temporarily operate the system to maintain *zone* temperatures down to 55°F (13°C) or up to 85°F (29°C).

4. Ductless heat pumps.

Each thermostat shall be capable of being set by adjustment or selection of sensors and configured as follows:

1. When used to control heating only: 55°F to 75°F;
2. When used to control cooling only: 70°F to 85°F;
3. All other: 55°F to 85°F with an adjustable dead band configured to at least 5°F in accordance with Section C403.4.1.2.

C403.4.11 Direct digital control systems. Direct digital control (DDC) shall be required as specified in Sections C403.4.11.1 through C403.4.11.3.

C403.4.11.1 DDC applications. DDC shall be provided in the applications and qualifications listed in Table C403.4.11.1.

TABLE C403.4.11.1
DDC APPLICATIONS AND QUALIFICATIONS

Building Status	Application	Qualifications
New Building	Air-handling system and all zones served by the system	All air-handling systems in buildings with building cooling capacity greater than 780,000 Btu/h
	Air-handling system and all zones served by the system	Individual systems supplying more than three zones and with fan system bhp of 10 hp and larger
	Chilled-water plant and all coils and terminal units served by the system	Individual plants supplying more than three zones and with design cooling capacity of 300,000 Btu/h and larger
	Hot-water plant and all coils and terminal units served by the system	Individual plants supplying more than three zones and with design heating capacity of 300,000 Btu/h and larger
Alteration or addition	Zone terminal units such as VAV box	Where existing zones served by the same air-handling, chilled-water, or hot-water system have DDC
	Air-handling system or fan coil	Where existing air-handling system(s) and fan coil(s) served by the same chilled- or hot-water plant have DDC
	New air-handling system and all new zones served by the system	Individual systems with fan system bhp 10 hp and larger and supplying more than three zones and more than 75% of zones are new
	New or upgraded chilled-water plant	Where all chillers are new and plant design cooling capacity is 300,000 Btu/h and larger
	New or upgraded hot-water plant	Where all boilers are new and plant design heating capacity is 300,000 Btu/h and larger

C403.4.11.2 DDC controls. Where DDC is required by Section C403.4.11.1, the DDC system shall be capable of all of the following, as required to provide the system and zone control logic required in Sections C403.2, C403.4.3, C403.5, and C403.6.8:

1. Monitoring zone and system demand for fan pressure, pump pressure, heating and cooling.
2. Transferring zone and system demand information from zones to air distribution system controllers and from air distribution systems to heating and cooling plant controllers.

C403.4.11.3 DDC display. Where DDC is required by Section C403.4.11.1 for new buildings, the DDC system shall be capable of trending and graphically displaying input and output points.

C403.4.12 Pressure independent control valves. Where design flow rate of heating water and chilled water coils is 10 GPM or higher, modulating pressure independent control valves shall be provided.

C403.5 Economizers. Air economizers shall be provided on all new cooling systems including those serving computer server rooms, electronic equipment, radio equipment, and telephone switchgear. Economizers shall comply with Sections C403.5.1 through C403.5.5.

Exception: Economizers are not required for the systems listed below:

1. Cooling systems not installed outdoors nor in a mechanical room adjacent to outdoors and installed in conjunction with DOAS complying with Section C403.3.5 and serving only spaces with year-round cooling loads from lights and equipment of less than 5 watts per square foot.
2. Unitary or packaged systems serving one zone with dehumidification ((~~that affect other systems so as to~~)) where an economizer would increase the overall building energy consumption. New humidification equipment shall comply with Section C403.3.2.5.
3. Unitary or packaged systems serving one zone where the cooling efficiency meets or exceeds the efficiency requirements in Table C403.5(3).

4. Equipment serving chilled beams and chilled ceiling space cooling systems only which are provided with a water economizer meeting the requirements of Section C403.5.4.
5. For Group R occupancies, cooling units installed outdoors or in a mechanical room adjacent to outdoors with a total cooling capacity less than 20,000 Btu/h and other cooling units with a total cooling capacity less than 54,000 Btu/h provided that these are high-efficiency cooling equipment with IEER, CEER, SEER, and EER values more than 15 percent higher than minimum efficiencies listed in Tables C403.3.2(1) through (3), in the appropriate size category, using the same test procedures. Equipment shall be listed in the appropriate certification program to qualify for this exception. For split systems, compliance is based on the cooling capacity of individual fan coil units.
6. Equipment used to cool *Controlled Plant Growth Environments* provided these are high-efficiency cooling equipment with SEER, EER and IEER values a minimum of 20 percent greater than the values listed in Tables C403.3.2(1), (3) and (7).
7. Equipment serving a space with year-round cooling loads from lights and equipment of 5 watts per square foot or greater complying with the following criteria:
   - 7.1. Equipment serving the space utilizes chilled water as the cooling source; and
   - 7.2. The chilled water plant includes a condenser heat recovery system that meets the requirements of Section C403.9.5 or the building and water-cooled system meets the following requirements:
     - 7.2.1. A minimum of 90 percent (capacity-weighted) of the building space heat is provided by hydronic heating water.
     - 7.2.2. Chilled water plant includes a heat recovery chiller or water-to-water heat pump capable of rejecting heat from the chilled water system to the hydronic heating equipment capacity.
     - 7.2.3. Heat recovery chillers shall have a minimum COP of 7.0 when providing heating and cooling water simultaneously.
8. Water-cooled equipment served by systems meeting the requirements of Section C403.9.2.4, Condenser heat recovery.
9. Dedicated outdoor air systems that include energy recovery as required by Section C403.7.6 but that do not include mechanical cooling.
10. Dedicated outdoor air systems not required by Section C403.7.6 to include energy recovery that modulate the supply airflow to provide only the minimum outdoor air required by Section C403.2.2.1 for ventilation, exhaust air make-up, or other process air delivery.
11. Equipment used to cool any dedicated server room, electronic equipment room, elevator machine room or telecom switch room provided the system complies with Option a, b, ((~~or~~)) c, d or e in ((~~the table~~)) Table C403.5(11) below. The total cooling capacity of all fan systems qualifying under this exception without economizers shall not exceed 240,000 Btu/h per building or 10 percent of its air economizer capacity, whichever is greater. This exception shall not be used for Total Building Performance or Target Performance Path compliance.
12. Medical and laboratory equipment that is directly water-cooled and is not dependent upon space air temperature.

TABLE C403.5(11)
SERVER ROOM, ELECTRONIC EQUIPMENT ROOM OR TELECOM ROOM COOLING EQUIPMENT

	Equipment Type	Higher Equipment Efficiency	Part-Load Control	Economizer
Option a	Tables C403.3.2(1) and C403.3.2(2)[a]	+15%[b]	Required over 85,000 Btu/h[c]	None Required
Option b	Tables C403.3.2(1) and C403.3.2(2)[a]	+5%[d]	Required over 85,000 Btu/h[c]	Water-side Economizer[e]
Option c	ASHRAE Standard 127[f]	+0%[g]	Required over 85,000 Btu/h[c]	Water-side Economizer[e]
Option d	Table C403.2.3(7)[h]	+25%[i]	Required for all chillers[j]	None Required
Option e	Table C403.2.3(7)[h]	+10/15%[k]	Required over 85,000 Btu/h[c]	Dedicated waterside economizer[e]

((~~Notes for Exception 11~~)) Footnotes for Table C403.5(11):

a. For a system where all of the cooling equipment is subject to the AHRI standards listed in Tables C403.3.2(1) and C403.3.2(2), the system shall comply with ((~~all of the following~~)) the higher equipment efficiency, part-load control and economizer requirements of the row in which this footnote is located, including the associated footnotes (note that if the system contains any cooling equipment that exceeds the capacity limits in Table C403.3.2(1) or C403.3.2(2), or if the system contains any cooling equipment that is not included in Table C403.3.2(1) or C403.3.2(2), then the system is not allowed to use this option).

b. The cooling equipment shall have an SEER/EER value and an IEER/IPLV value that ((~~is~~)) are each a minimum of 15 percent greater than the value listed in Tables C403.3.2(1) and C403.3.2(2).

c. For units with a total cooling capacity over 85,000 Btu/h, the system shall utilize part-load capacity control schemes that are able to modulate to a part-load capacity of 50 percent of the load or less that results in the compressor operating at the same or higher EER at part loads than at full load (e.g., minimum of two-stages of compressor unloading such as cylinder unloading, two-stage scrolls, dual tandem scrolls, but hot gas bypass is not credited as a compressor unloading system).

d. The cooling equipment shall have an SEER/EER value and an IEER/IPLV value that ((~~is~~)) are each a minimum of 5 percent greater than the value listed in Tables C403.3.2(1) and C403.3.2(2).

e. The system shall include a water economizer in lieu of air economizer. Water economizers shall meet the requirements of Sections C403.5.1 and C403.5.2 and be capable of providing the total concurrent cooling load served by the connected terminal equipment lacking airside economizer, at outside air temperatures of 50°F dry-bulb/45°F wet-bulb and below. For this calculation, all factors including solar and internal load shall be the same as those used for peak load calculations, except for the outside temperatures. The equipment shall be served by a dedicated condenser water system unless a non-dedicated condenser water system exists that can provide appropriate water temperatures during hours when water-side economizer cooling is available.

f. For a system where all cooling equipment is subject to ASHRAE Standard 127, the system shall comply with the higher equipment efficiency, part-load control and economizer requirements of the row in which this footnote is located, including the associated footnotes.

g. The cooling equipment subject to ASHRAE Standard 127 shall have an ((~~EER value and an IPLV~~)) SCOP value that is ((~~equal or~~)) a minimum of 10 percent greater than the value listed in Tables C403.3.2(1) and C403.3.2(2) (1.10 x values in these tables) when determined in accordance with the rating conditions in ASHRAE Standard 127 (i.e., not the rating conditions in AHRI Standard 210/240 or 340/360). This information shall be provided by an independent third party.

h. For a system with chillers subject to the AHRI standards listed in Table C403.3.2(7) (e.g., a chilled water system with fan coil units), the system shall comply with the higher equipment efficiency, part-load control and economizer requirements of the row in which this footnote is located, including the associated footnotes.

i. The cooling equipment shall have an full-load EER value and an IPLV value that is a minimum of 25 percent greater than the value listed in Table C403.3.2(7) (1.25 x value in Table C403.3.2(7) or a full-load and IPLV kW/ton that is at least 25 percent lower than the value listed in Table C403.3.2(7) (0.75 x value in Table C403.3.2(7)).

j. For all chillers, the system shall utilize part-load capacity control schemes that are able to modulate to a part-load capacity of 50 percent of the load or less and that result in the compressor operating at the same or higher EER at part loads than at full load (e.g., minimum of two-stages of compressor unloading such as cylinder unloading, two-stage scrolls, or dual tandem scrolls, but hot gas bypass is not a qualifying compressor unloading system).

k. For air-cooled chillers, the cooling equipment shall have an IPLV EER value that is a minimum of 10 percent greater than the IPLV EER value listed in Table C403.3.2(7) (1.10 x values in Table C403.3.2(7). For water-cooled chillers, the cooling equipment shall have an IPLV kW/ton that is at least 15 percent lower than the IPLV kW/ton value listed in Table C403.3.2(7) (0.85 x values in Table C403.3.2(7)).

TABLE C403.5(3)
EQUIPMENT EFFICIENCY PERFORMANCE EXCEPTION FOR ECONOMIZERS

Climate Zone	Efficiency Improvement[a]
4C	64%
5B	59%

a. If a unit is rated with an IPLV, IEER or SEER then to eliminate the required air or water economizer, the minimum cooling efficiency of the HVAC unit must be increased by the percentage shown. If the HVAC unit is only rated with a full load metric like EER or COP cooling, then these must be increased by the percentage shown.

C403.5.1 Integrated economizer control. Economizer systems shall be integrated with the mechanical cooling system and be configured to provide partial cooling even where additional mechanical cooling is required to provide the remainder of the cooling load. Controls shall not be capable of creating a false load in the mechanical cooling system by limiting or disabling the economizer or any other means, such as hot gas bypass, except at the lowest stage of mechanical cooling.

Units that include an air economizer shall comply with the following:

1. Unit controls shall have the mechanical cooling capacity control interlocked with the air economizer controls such that the outdoor air damper is at the 100 percent open position when mechanical cooling is on and the outdoor air damper does not begin to close to prevent coil freezing due to minimum compressor run time until the leaving air temperature is less than 45°F (7°C).
2. Direct expansion (DX) units with cooling capacity 65,000 Btu/H (19 kW) or greater of rated capacity shall comply with the following:
   2.1. DX units that control the capacity of the mechanical cooling directly based on occupied space temperature shall have not fewer than two stages of mechanical cooling capacity.
   2.2. Other DX units, including those that control space temperature by modulating the airflow to the space, shall be in accordance with Table C403.5.1.

TABLE C403.5.1
DX COOLING STAGE REQUIREMENTS FOR MODULATING AIRFLOW UNITS

Rating Capacity	Minimum Number of Mechanical Cooling Stages	Minimum Compressor Displacement[a]
≥ 65,000 Btu/h and < 240,000 Btu/h	3 stages	≤ 35% of full load
≥ 240,000 Btu/h	4 stages	≤ 25% full load

For SI: 1 Btu/h = 0.2931 W

a. For *mechanical cooling* stage control that does not use variable compressor displacement, the percent displacement shall be equivalent to the mechanical cooling capacity reduction evaluated at the full load rating conditions for the compressor.

C403.5.2 Economizer heating system impact. HVAC system design and economizer controls shall be such that economizer operation does not increase building heating energy use during normal operation.

C403.6.3 Dual duct and mixing VAV systems, terminal devices. Systems that have one warm air duct and one cool air duct shall use terminal devices which are capable of and configured to reduce the flow from one duct to a minimum before mixing of air from the other duct takes place.

C403.6.4 Supply-air temperature reset controls. Multiple *zone* HVAC systems shall include controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperature. The controls shall be configured to reset the supply air temperature at least 25 percent of the difference between the design supply-air temperature and the design room air temperature.

Exceptions:

1. Systems that prevent reheating, recooling or mixing of heated and cooled supply air.
2. Seventy-five percent (75%) of the energy for reheating is from a site-recovered source.
3. Zones with peak supply air quantities of 300 cfm (142 L/s) or less.

C403.6.5 Multiple-zone VAV system ventilation optimization control. Multiple-zone VAV systems with direct digital control of individual zone boxes reporting to a central control panel shall have *automatic* controls configured to reduce outdoor air intake flow below design rates in response to changes in system ventilation efficiency (E_v) as defined by the *International Mechanical Code.*

Exceptions:

1. VAV systems with zonal transfer fans that recirculate air from other zones without directly mixing it with outdoor air, dual-duct dual-fan VAV systems, and VAV systems with fan-powered terminal units.
2. Systems where total design exhaust airflow is more than 70 percent of total design outdoor air intake flow requirements.

C403.6.6 Parallel-flow fan-powered VAV air terminal control. Parallel-flow fan-powered VAV air terminals shall have *automatic* controls configured to:

1. Turn off the terminal fan except when space heating is required or where required for ventilation.
2. Turn on the terminal fan as the first stage of heating before the heating coil is activated.
3. During heating for warmup or setback temperature control, either:
   3.1. Operate the terminal fan and heating coil without primary air.
   3.2. Reverse the terminal damper logic and provide heating from the central air handler by primary air.

C403.6.7 Hydronic and multiple-zone HVAC system controls and equipment. Hydronic and multiple-zone HVAC system controls and equipment shall comply with this section.

For buildings with a total equipment cooling capacity of 300 tons and above, the equipment shall comply with one of the following:

1. No one unit shall have a cooling capacity of more than 2/3 of the total installed cooling equipment capacity.
2. The equipment shall have a variable speed drive.
3. The equipment shall have multiple compressors.

C403.6.8 Set points for direct digital control. For systems with direct digital control of individual *zones* reporting to the central control panel, the static pressure set point shall be reset based on the *zone* requiring the most pressure. In such cases, the set point is reset lower until one zone damper is nearly wide open. The direct digital controls shall be capable of monitoring zone damper positions or shall have an alternative method of indicating the need for static pressure that is configured to provide all of the following:

1. Automatically detecting any zone that excessively drives the reset logic.
2. Generating an alarm to the system operational location.
3. Allowing an operator to readily remove one or more zones from the reset algorithm.

C403.6.9 Static pressure sensor location. Static pressure sensors used to control VAV fans shall be located such that the controller set point is no greater than 1.2 inches w.c. (299 Pa). Where this results in one or more sensors being located downstream of major duct splits, not less than one sensor shall be located on each major branch to ensure that static pressure can be maintained in each branch.

Exception: Systems complying with Section C403.6.8.

C403.6.10 High efficiency variable air volume (VAV) systems. For HVAC systems subject to the requirements of Section C403.3.5 but utilizing Exception 2 of that section, a high efficiency multiple-zone VAV system may be provided without a separate parallel DOAS when the system is designed, installed, and configured to comply with all of the following criteria in addition to the applicable requirements of Sections C403.8.6 through C403.8.8. (((~~this~~)) This exception shall not be used as a substitution for a DOAS per Section C406.6 or C406.7:

1. Each VAV system must serve a minimum of 3,000 square feet (278.7 m^2) and have a minimum of five VAV zones.
2. The VAV systems are provided with airside economizer per Section C403.5 without exceptions.
3. A direct-digital control (DDC) system is provided to control the VAV air handling units and associated terminal units per Section C403.4.11 regardless of sizing thresholds of Table C403.4.11.1.
4. Multiple-zone VAV systems with a minimum outdoor air requirement of 2,500 cfm (1180 L/s) or greater shall be equipped with a device capable of measuring outdoor airflow intake under all load conditions. The system shall be capable of increasing or reducing the outdoor airflow intake based on feedback from the VAV terminal units as required by Section C403.6.5, without exceptions, and Section C403.7.1, Demand controlled ventilation.
5. Multiple-zone VAV systems with a minimum outdoor air requirement of 2,500 cfm (1180 L/s) or greater shall be equipped with a device capable of measuring supply airflow to the VAV terminal units under all load conditions.
6. In addition to meeting the zone isolation requirements of C403.2.1 a single VAV air handling unit shall not serve more than 50,000 square feet (4645 m^2) unless a single floor is greater than 50,000 square feet (4645 m^2) in which case the air handler is permitted to serve the entire floor.
7. The primary maximum cooling air for the VAV terminal units serving interior cooling load driven zones shall be sized for a supply air temperature that is a minimum of 5°F greater than the supply air temperature for the exterior zones in cooling.
8. Air terminal units with a minimum primary airflow set point of 50 percent or greater of the maximum primary airflow set point shall be sized with an inlet velocity of no greater than 900 feet per minute. Allowable fan motor horsepower shall not exceed 90 percent of the allowable HVAC *fan system bhp* (Option 2) as defined by Section C403.8.1.1.
9. All fan powered VAV terminal units (series or parallel) shall be provided with electronically commutated motors. The DDC system shall be configured to vary the speed of the motor as a function of the heating and cooling load in the space. Minimum speed shall not be greater than 66 percent of design airflow required for the greater of heating or cooling operation. Minimum speed shall be used during periods of low heating and cooling operation and ventilation-only operation.

   Exception: For series fan powered terminal units where the volume of primary air required to deliver the ventilation requirements at minimum speed exceeds the air that would be delivered at the speed defined above, the minimum speed set point shall be configured to exceed the value required to provide the required ventilation air.
10. Fan-powered VAV terminal units shall only be permitted at perimeter zones with an envelope heating load requirement. All other VAV terminal units shall be single duct terminal units.

    Exception: Fan powered VAV terminal units are allowed at interior spaces with an occupant load greater than or equal to 25 people per 1000 square feet of floor area (as established in Table 403.3.1.1 of the *International Mechanical Code*) with demand control ventilation in accordance with Section C403.7.1.
11. When in occupied heating or in occupied dead band between heating and cooling all fan powered VAV terminal units shall be configured to reset the primary air supply set point, based on the VAV air handling unit outdoor air vent fraction, to the minimum ventilation airflow required per *International Mechanical Code.*
12. Spaces that are larger than 150 square feet (14 m^2) and with an occupant load greater than or equal to ((~~25~~)) 15 people per 1000 square feet (93 m^2) of floor area (as established in Table 403.3.1.1 of the *International Mechanical Code*) shall be provided with all of the following features:
    - 12.1. A dedicated VAV terminal unit capable of controlling the space temperature and minimum ventilation shall be provided.
    - 12.2. Demand control ventilation (DCV) shall be provided that utilizes a carbon dioxide sensor to reset the ventilation set point of the VAV terminal unit from the design minimum to design maximum ventilation rate as required by Chapter 4 of the *International Mechanical Code.*
    - 12.3. Occupancy sensors shall be provided that are configured to reduce the minimum ventilation rate to zero and setback room temperature set points by a minimum of 5°F, for both cooling and heating, when the space is unoccupied.
13. Dedicated data centers, computer rooms, electronic equipment rooms, telecom rooms, or other similar spaces with cooling loads greater than 5 watts/ft^2 shall be provided with separate, cooling systems to allow the VAV air handlers to turn off during unoccupied hours in the office space and to allow the supply air temperature reset to occur.

    Exception: The VAV air handling unit and VAV terminal units may be used for secondary backup cooling when there is a failure of the primary HVAC system.

    Additionally, computer rooms, electronic equipment rooms, telecom rooms, or other similar spaces shall be provided with airside economizer in accordance with Section C403.5 without using the exceptions to Section C403.5.

Exception: Heat recovery per exception 9 of Section C403.5 may be in lieu of airside economizer for the separate, independent HVAC system.

14. HVAC system central heating or cooling plant will include a minimum of one of the following options:
    14.1. VAV terminal units with hydronic heating coils connected to systems with hot water generation equipment limited to the following types of equipment: gas-fired hydronic boilers with a thermal efficiency, Et, of not less than 92 percent, air-to-water heat pumps or heat recovery chillers. Hydronic heating coils shall be sized for a maximum entering hot water temperature of 120°F (48.9°C) for peak anticipated heating load conditions.
    14.2. Chilled water VAV air handing units connected to systems with chilled water generation equipment with IPLV values more than 25 percent higher than the minimum part load efficiencies listed in Table C403.3.2(7), in the appropriate size category, using the same test procedures. Equipment shall be listed in the appropriate certification program to qualify. The smallest chiller or compressor in the central plant shall not exceed 20 percent of the total central plant cooling capacity or the chilled water system shall include thermal storage sized for a minimum of 20 percent of the total central cooling plant capacity.
15. The DDC system shall include a fault detection and diagnostics (FDD) system complying with the following:
    15.1. The following temperature sensors shall be permanently installed to monitor system operation:
        15.1.1. Outside air.
        15.1.2. Supply air.
        15.1.3. Return air.
    15.2. Temperature sensors shall have an accuracy of ±2°F (1.1°C) over the range of 40°F to 80°F (4°C to 26.7°C).
    15.3. The VAV air handling unit controller shall be configured to provide system status by indicating the following:
        15.3.1. Free cooling available.
        15.3.2. Economizer enabled.
        15.3.3. Compressor enabled.
        15.3.4. Heating enabled.
        15.3.5. Mixed air low limit cycle active.
        15.3.6. The current value of each sensor.
    15.4. The VAV air handling unit controller shall be capable of manually initiating each operating mode so that the operation of compressors, economizers, fans and the heating system can be independently tested and verified.
    15.5. The VAV air handling unit shall be configured to report faults to a fault management application able to be accessed by day-to-day operating or service personnel or annunciated locally on zone thermostats.
    15.6. The VAV terminal unit shall be configured to report if the VAV inlet valve has failed by performing the following diagnostic check at a maximum interval of once a month:
        15.6.1. Command VAV terminal unit primary air inlet valve closed and verify that primary airflow goes to zero <u>or other *approved* means to verify that the VAV terminal unit damper actuator and flow ring are operating properly</u>.
        15.6.2. Command VAV thermal unit primary air inlet valve to design airflow and verify that unit is controlling to with 10% of design airflow.
    15.7. The VAV terminal unit shall be configured to report and trend when the zone is driving the following VAV air handling unit reset sequences. The building operator shall have the capability to exclude zones used in the reset sequences from the DDC control system graphical user interface:
        15.7.1. Supply air temperature set point reset to lowest supply air temperature set point for cooling operation.
        15.7.2. Supply air duct static pressure set point reset for the highest duct static pressure set point allowable.
    15.8. The FDD system shall be configured to detect the following faults:
        15.8.1. Air temperature sensor failure/fault.
        15.8.2. Not economizing when the unit should be economizing.
        15.8.3. Economizing when the unit should not be economizing.
        15.8.4. Outdoor air or return air damper not modulating.
        15.8.5. Excess outdoor air.
        15.8.6. VAV terminal unit primary air valve failure.

C403.7 Ventilation and exhaust systems. In addition to other requirements of Section C403 applicable to the provisions of ventilation air or the exhaust of air, ventilation and exhaust systems shall be in accordance with Sections C403.7.1 through C403.7.8.

C403.7.1 Demand control ventilation. Demand control ventilation (DCV) shall be provided for spaces larger than 500 square feet (46 m^2) and with an occupant load greater than or equal to ((~~25~~)) 15 people per 1000 square feet (93 m^2) of floor area (as established in Table 403.3.1.1 of the *International Mechanical Code*) and served by systems with one or more of the following:

1. An air-side economizer.
2. *Automatic* modulating control of the outdoor air damper.
3. A design outdoor airflow greater than 3,000 cfm (1416 L/s).

Exception: *Demand control ventilation* is not required for systems and spaces as follows:

1. Systems with energy recovery complying with Section C403.7.6.1 or Section C403.3.5.1. This exception is not available for space types located within the "inclusions" column of Groups A-1 and A-3 occupancy classifications of Table C403.3.5.
2. Multiple-*zone* systems without direct digital control of individual zones communicating with a central control panel.
3. System with a design outdoor airflow less than 750 cfm (354 L/s).

((~~4. Spaces where the supply airflow rate minus any makeup or outgoing transfer air requirement is less than 1,200 cfm (566 L/s).~~))

4. Spaces, including but not limited to dining areas, where more than 75 percent of the space design outdoor airflow is transfer air required for makeup air supplying an adjacent commercial kitchen.
5. Ventilation provided for process loads only.
6. Spaces with one of the following occupancy categories (as defined by the *International Mechanical Code*): Correctional cells, daycare sickrooms, science labs, barbers, beauty and nail salons, and bowling alley seating.
7. Dormitory sleeping areas.

C403.7.2 Occupancy sensors. Classrooms, gyms, auditoriums, conference rooms, and other spaces with an occupant load greater than or equal to 25 people per 1000 square feet (93 m^2) of floor area (as established in Table 403.3.1.1 of the *International Mechanical Code*) that are larger than 500 square feet (46 m^2) of floor area shall have occupancy sensor control that will either close outside air dampers, close ventilation supply dampers or turn off ventilation equipment when the space is unoccupied except where equipped with another means to automatically reduce outside air intake below design rates when spaces are partially occupied.

Exceptions:

1. Spaces with one of the following occupancy categories (as defined by the *International Mechanical Code*):
   1.1. Correctional cells.
   1.2. Daycare sickrooms.
   1.3. Science labs.
   1.4. Barbers.
   1.5. Beauty and nail salons.
   1.6. Bowling alley seating.
2. When the space is unoccupied during occupied building hours, a ventilation rate equal to or less than the zone outdoor airflow as defined in Section 403.3.1.1.1 of the *International Mechanical Code* with a zone population of zero.

C403.7.3. Ventilation air heating control. Units that provide ventilation air to multiple zones and operate in conjunction with zone heating and cooling systems shall not use heating or heat recovery to warm supply air to a temperature greater than 60°F (16°C) when representative building loads or outdoor air temperature indicate that the majority of zones require cooling.

C403.7.4 Automatic control of HVAC systems serving guestrooms. In Group R-1 buildings containing more than 50 guestrooms, each guestroom shall be provided with controls complying with the provisions of Sections C403.7.4.1 and C403.7.4.2. Card key controls comply with these requirements.

C403.7.4.1 Temperature set point controls. Controls shall be provided on each HVAC system that are capable of and configured to automatically raise the cooling set point and lower the heating set point by not less than 4°F (2°C) from the occupant set point within 30 minutes after the occupants have left the guestroom. The controls shall be capable of and configured to automatically raise the cooling set point to not lower than 80°F (27°C) and lower the heating set point to not higher than 60°F (16°C) when the guestroom is unrented or has been continuously unoccupied for over 16 hours or a *networked guestroom control system* indicates that the guestroom is unrented and the guestroom is unoccupied for more than

30 minutes. A *networked guestroom control system* that is capable of returning the thermostat set points to default occupied set points 60 minutes prior to the time a guestroom is scheduled to be occupied is not precluded by this section. Cooling that is capable of limiting relative humidity with a set point not lower than 65 percent relative humidity during unoccupied periods is not precluded by this section.

C403.7.4.2 Ventilation controls. Controls shall be provided on each HVAC system that are capable of and configured to automatically turn off the ventilation and exhaust fans within 30 minutes of the occupants leaving the guestroom, or isolation devices shall be provided to each guestroom that are capable of automatically shutting off the supply of outdoor air to and exhaust air from the guestroom.

Exception: Guestroom ventilation systems are not precluded from having an *automatic* daily pre-occupancy purge cycle that provides daily outdoor air ventilation during unrented periods at the design ventilation rate for 60 minutes, or at a rate and duration equivalent to one air change.

C403.7.5 Enclosed loading dock, motor vehicle repair garage and parking garage exhaust ventilation system controls. Mechanical ventilation systems for enclosed loading docks, motor vehicle repair garages and parking garages shall be designed to exhaust the airflow rates (maximum and minimum) determined in accordance with the *International Mechanical Code.*

Ventilation systems shall be equipped with a control device that operates the system automatically by means of carbon monoxide detectors applied in conjunction with nitrogen dioxide detectors. Controllers shall be configured to shut off fans or modulate fan speed to 50 percent or less of design capacity, or intermittently operate fans less than 20 percent of the occupied time or as required to maintain acceptable contaminant levels in accordance with the *International Mechanical Code* provisions.

Gas sensor controllers used to activate the exhaust ventilation system shall stage or modulate fan speed upon detection of specified gas levels. All equipment used in sensor controlled systems shall be designed for the specific use and installed in accordance with the manufacturer's recommendations. The system shall be arranged to operate automatically by means of carbon monoxide detectors applied in conjunction with nitrogen dioxide detectors. ((~~Garage~~)) Parking garages, repair garages and loading docks shall be equipped with a controller and a full array of carbon monoxide (CO) sensors set to maintain levels of carbon monoxide below 35 parts per million (ppm). Additionally, a full array of nitrogen dioxide detectors shall be connected to the controller set to maintain the nitrogen dioxide level below the OSHA standard for eight hour exposure.

Spacing and location of the sensors shall be installed in accordance with manufacturer recommendations.

C403.7.5.1 System activation devices for enclosed loading docks. Ventilation systems for enclosed loading docks shall operate continuously during unoccupied hours at the minimum ventilation rate required by Section 404 of the International Mechanical Code and shall be activated to the full required ventilation rate by one of the following:

1. Gas sensors installed in accordance with the *International Mechanical Code;* or
2. Occupant detection sensors used to activate the system that detects entry into the loading area along both the vehicle and pedestrian pathways.

C403.7.5.2 System activation devices for enclosed parking garages. Ventilation systems for enclosed parking garages shall be activated by gas sensors.

Exception: A parking garage ventilation system having a total design capacity under 8,000 cfm may use occupant sensors to activate the full required ventilation rate.

C403.7.6 Energy recovery ventilation systems. Any system with minimum outside air requirements at design conditions greater than 5,000 cfm or any system where the system's supply airflow rate exceeds the value listed in Tables C403.7.6(1) and C403.7.6(2), based on the climate zone and percentage of outdoor airflow rate at design conditions, shall include an energy recovery system. Table C403.7.6(1) shall be used for all ventilation systems that operate less than 8,000 hours per year, and Table C403.7.6(2) shall be used for all ventilation systems that operate 8,000 hours or more per year. The energy recovery system shall have the capability to provide a change in the enthalpy of the outdoor air supply of not less than ((~~50~~)) 60 percent of the difference between the outdoor air and return air enthalpies, at design conditions. Where an air economizer is required, the energy recovery system shall include a bypass of the energy recovery media for both the outdoor air and exhaust air or return air dampers and controls which permit operation of the air economizer as required by Section C403.5. Where a single room or space is supplied by multiple units, the aggregate ventilation (cfm) of those units shall be used in applying this requirement. The return/exhaust air stream temperature for heat recovery device selection shall be 70°F (21°C) at 30 percent relative humidity, or as calculated by the registered design professional.

SDCI Informative Note: In Seattle, the energy recovery effectiveness is determined typically by the winter heat recovery condition. See example below for how the minimum supply air enthalpy leaving the energy recovery media is calculated for the winter condition:

1. In Seattle, the winter outdoor design air temperature is 24°F as specified in Appendix C. The registered design professional shall determine the coincident winter wet bulb temperature or percent relative humidity at the anticipated design conditions. Based on these conditions the outdoor design air enthalpy is determined from a psychrometric chart.

2. Determine the return/exhaust air stream enthalpy from a psychrometric chart based on the 70°F (21°C) at 30 percent relative humidity.
3. Calculate the 60% difference between the outside air and return air enthalpies at design winter conditions.
4. See example below:
   a. OA Enthalpy at 24°F/23°F (drybulb/wetbulb) = 8.2 BTU/LB
   b. RA/EA Enthalpy at 70°F and 30% RH = 21.9 BTU/LB
   c. SA Enthalpy Minimum Leaving Energy Recovery Media
      = (8.2 + (21.9 – 8.2) * 60%)
      = 16.42 BTU/LB

(Note that this example represents 60% enthalpy recovery. For an equivalent sensible-only recovery system, it would take 73.9% effectiveness (increasing from 24°F DB to 58°F DB) to achieve the same enthalpy recovery.)

Exceptions:

1. The energy recovery systems for occupancy type I-2 hospitals, medical office buildings, and buildings that primarily consist of technical laboratory spaces, are permitted to provide a change of enthalpy of the outdoor air and return air of not less than 50 percent of the difference between the outdoor air and return air enthalpies, at design conditions. These occupancies are also permitted to utilize exception #3.
2. The energy recovery systems for R-1 and R-2 occupancies shall have a 60 percent minimum sensible heat recovery effectiveness, in lieu of 60 percent enthalpy recovery effectiveness. The return/exhaust air stream temperature for heat recovery device selection shall be 70°F (21°C), or as calculated by the registered design professional.
3. An energy recovery ventilation system shall not be required in any of the following conditions:
   1. Where energy recovery systems are restricted per Section 514 of the International Mechanical Code to sensible energy, recovery shall comply with one of the following:
      1.1. Kitchen exhaust systems where they comply with Section C403.7.7.1.
      1.2. Laboratory fume hood systems where they comply with Exception 2 of Section C403.7.6.
      1.3. Other sensible energy recovery systems with the capability to provide a change in dry bulb temperature of the outdoor air supply of not less than 50 percent of the difference between the outdoor air and the return air dry bulb temperatures, at design conditions.
   2. Laboratory fume hood systems that include at least one of the following features and also comply with Section C403.7.7.2:
      2.1. Variable-air-volume hood exhaust and room supply systems capable of reducing exhaust and makeup air volume to 50 percent or less of design values.
      2.2. Direct makeup (auxiliary) air supply equal to at least 75 percent of the exhaust rate, heated no warmer than 2°F (1.1°C) above room set point, cooled to no cooler than 3°F (1.7°C) below room set point, no humidification added, and no simultaneous heating and cooling used for dehumidification control.
   3. Systems serving spaces that are heated to less than 60°F (15.5°C) and are not cooled.
   4. Where more than 60 percent of the outdoor air heating energy is provided from site-recovered energy.
   5. Systems exhausting toxic, flammable, paint or corrosive fumes or dust.
   6. Cooling energy recovery in Climate Zones 3C, 4C, 5B, 5C, 6B, 7 and 8.
   7. Systems requiring dehumidification that employ energy recovery in series with the cooling coil.
   8. Multi-zone systems where the supply airflow rate is less than the values specified in Tables C403.7.6(1) and C403.7.6(2) for the corresponding percent of outdoor air. Where a value of NR is listed, energy recovery shall not be required.
   9. Equipment which meets the requirements of Section C403.9.2.4.
   10. Systems serving Group R-1 and R-3 dwelling or sleeping units where the largest source of air exhausted at a single location at the building exterior is less than 25 percent of the design outdoor air flow rate.

C403.7.8 Shutoff dampers. Mechanical openings shall be provided with shutoff dampers in accordance with Sections C403.7.8.1 through C403.7.8.4.

C403.7.8.1 Shutoff dampers for building isolation. Outdoor air supply, exhaust openings and relief outlets and stairway and elevator hoistway shaft vents shall be provided with Class I motorized dampers. See Sections C403.10.1 and C403.10.2 for ductwork insulation requirements upstream and downstream of the shutoff damper.

Exceptions:

1. Gravity (nonmotorized) dampers shall be permitted in lieu of motorized dampers as follows:
   - 1.1. Relief dampers serving systems less than ((~~5,000~~)) 300 cfm total supply shall be permitted. ((~~in buildings less than three stories in height.~~))
   - 1.2. Gravity (nonmotorized) dampers where the design outdoor air intake or exhaust capacity does not exceed ((~~400~~)) 300 cfm (189 L/s).
   - 1.3. Systems serving areas which require continuous operation for 24/7 occupancy schedules.
2. Shutoff dampers are not required in:
   - 2.1. Combustion air intakes.
   - 2.2. Systems serving areas which require continuous operation in animal hospitals, kennels and pounds, laboratories, and Group H, I and R occupancies.
   - 2.3. Subduct exhaust systems or other systems that are required to operate continuously by the *International Mechanical Code*.
   - 2.4. Type I grease exhaust systems or other systems where dampers are prohibited by the *International Mechanical Code* to be in the airstream.
   - 2.5. Unconditioned stairwells or unconditioned elevator hoistway shafts that are only connected to unconditioned spaces.

C403.7.8.2 Shutoff dampers for return air. Return air openings used for airside economizer operation shall be equipped with Class I motorized dampers.

C403.7.8.3 Damper leakage rating. Class I dampers shall have a maximum leakage rate of 4 cfm/ft^2 (20.3 L/s × m^2) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D and shall be labeled by an approved agency for such purpose. Gravity (nonmotorized) dampers shall have an air leakage rate not greater than 20 cfm/ft^2 where not less than 24 inches (610 mm) in either dimension and 40 cfm/ft^2 where less than 24 inches in either dimension. The rate of air leakage shall be determined at 1.0 inch w.g. (249 Pa) when tested in accordance with AMCA 500D for such purpose. The dampers shall be labeled by an approve agency. Gravity dampers for ventilation air intakes shall be protected from direct exposure to wind.

Exceptions:

1. Gravity (nonmotorized) dampers are not required to be tested to verify the air leakage rating when installed in exhaust systems where the exhaust capacity does not exceed 400 cfm (189 L/s) and the gravity damper is provided with a gasketed seal.
2. Motorized dampers on return air openings in unitary packaged equipment that have the minimum leakage rate available from the manufacturer.

C403.7.8.4 Damper actuation. Outdoor air intake, relief and exhaust shutoff dampers shall be installed with *automatic* controls configured to close when the systems or spaces served are not in use or during unoccupied period warm-up and setback operation, unless the systems served require outdoor or exhaust air in accordance with the *International Mechanical Code* or the dampers are opened to provide intentional economizer cooling. Stairway and elevator hoistway shaft vent dampers shall be installed with *automatic* controls configured to open upon the activation of any fire alarm initiating device of the building's fire alarm system or the interruption of power to the damper.

C403.8 Fan and fan controls. Fans in HVAC systems shall comply with Sections C403.8.1 through C403.8.5.1.

The airflow requirements of Section C403.8.5.1 shall apply to all fan motors. Group R occupancy exhaust fans shall also comply with Section C403.8.4.

C403.8.1 Allowable fan motor horsepower. Each HVAC system having a total fan system motor nameplate horsepower exceeding 5 hp (3.7kW) at fan system design conditions shall not exceed the allowable *fan system motor nameplate hp* (Option 1) or *fan system bhp* (Option 2) as shown in Table C403.8.1(1). This includes supply fans, exhaust fans, return/relief fans, and fan-powered VAV air terminal units associated with systems providing heating or cooling capability. Single *zone* variable-air-volume systems shall comply with the constant volume fan power limitation. Zone heating and/or cooling terminal units installed in conjunction with a dedicated outdoor air system (DOAS) shall be evaluated as separate HVAC systems for allowable fan motor horsepower.

Exceptions:

1. Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust or return to maintain space pressure relationships necessary for occupant health and safety or environmental control shall be permitted to use variable volume fan power limitation.
2. Individual exhaust fans with motor nameplate horsepower of 1 hp or less are exempt from the allowable fan motor horsepower requirements, but must meet the requirements of Section C405.8 for fractional hp fan motors.

TABLE C403.8.1(1)
FAN POWER LIMITATION

	LIMIT	CONSTANT VOLUME	VARIABLE VOLUME
Option 1: Fan system motor nameplate hp	Allowable nameplate motor hp	$hp \leq CFM_S \times 0.0011$	$hp \leq CFM_S \times 0.0015$
Option 2: Fan system bhp	Allowable fan system bhp	$bhp \leq CFM_S \times 0.00094 + A$	$bhp \leq CFM_S \times 0.0013 + A$

For SI: 1 bhp = 735.5 W, 1 hp = 745.5 W, 1 cfm = 0.471 L/s.

where:

CFM_S = The maximum design supply airflow rate to *conditioned spaces* served by the system in cubic feet per minute.
Hp = The maximum combined motor nameplate horsepower.
Bhp = The maximum combined fan brake horsepower.
A = Sum of [PD × CFMD / 4131]

where:

PD = Each applicable pressure drop adjustment from Table C403.8.1(2) in. w.c.
CFM_D = The design airflow through each applicable device from Table C403.8.1(2) in cubic feet per minute.

TABLE C403.8.1(2)
FAN POWER LIMITATION PRESSURE DROP ADJUSTMENT

Device	Adjustment
Credits	
Return air or exhaust system required by code or accreditation standards to be fully ducted, or systems required to maintain air pressure differentials between adjacent rooms	0.5 inch w.c. (2.15 inches w.c. for laboratory and vivarium systems)
Return and/or exhaust air flow control devices	0.5 inch w.c.
Exhaust filters, scrubbers, or other exhaust treatment	The pressure drop of device calculated at fan system design condition
Particulate filtration credit: MERV 9 – 12	0.5 inch w.c.
Particulate filtration credit: MERV 13 – 15	0.9 inch w.c.
Particulate filtration credit: MERV 16 and greater and electronically enhanced filters	Pressure drop calculated at 2x clean filter pressure drop at fan system design condition
Carbon and other gas-phase air cleaners	Clean filter pressure drop at fan system design condition
Biosafety cabinet	Pressure drop of device at fan system design condition
Energy recovery device, other than coil runaround loop	For each airstream (2.2 × energy recovery effectiveness - 0.5 inch w.c.)
Coil runaround loop	0.6 inch w.c. for each airstream
Evaporative humidifier/cooler in series with another cooling coil	Pressure drop of device at fan system design conditions
Sound attenuation section (fans serving spaces with design background noise goals below NC35)	0.15 inch w.c.
Exhaust system serving fume hoods	0.35 inch w.c.
Laboratory and vivarium exhaust systems in high-rise buildings	0.25 inch w.c./100 feet of vertical duct exceeding 75 feet
Deductions	
Systems without central cooling device	-0.6 inch w.c.
Systems without central heating device	-0.3 inch w.c.
Systems with central electric resistance heating	-0.2 inch w.c.

For SI: 1 inch w.c. = 249 Pa, 1 inch = 25.4 mm.
w.c. = water column, NC = Noise criterion.

C403.8.2 Motor nameplate horsepower. For each fan, the selected fan motor shall be no larger than the first available motor size greater than the brake horsepower (bhp). The fan bhp shall be indicated on the design documents to allow for compliance verification by the *code official*.

Exceptions:

1. For fans less than 6 bhp (4413 W), where the first available motor larger than the brake horsepower has a nameplate rating within 50 percent of the bhp, selection of the next larger nameplate motor size is allowed.
2. For fans 6 bhp (4413 W) and larger, where the first available motor larger than the bhp has a nameplate rating within 30 percent of the bhp, selection of the next larger nameplate motor size is allowed.
3. For fans used only in *approved* life safety applications such as smoke evacuation.
4. Fans with motor nameplate horsepower less than 1 hp are exempt from this section.

C403.8.3 Fan efficiency. Fans shall have a fan efficiency grade (FEG) of 67 or higher based on manufacturers' certified data, as defined by AMCA 205. The total efficiency of the fan at the design point of operation shall be within 15 percentage points of the maximum total efficiency of the fan.

Exception: The following fans are not required to have a fan efficiency grade:

1. Individual fans with a motor nameplate horsepower of 5 hp (3.7 kW) or less that are not part of a group operated as the functional equivalent of a single fan.
2. Multiple fans in series or parallel that have a combined motor nameplate horsepower of 5 hp (3.7 kW) or less and are operated as the functional equivalent of a single fan.
3. Fans that are part of equipment covered under Section C403.3.2.
4. Fans included in an equipment package certified by an approved agency for air or energy performance.
5. Powered wall/roof ventilators.
6. Fans outside the scope of AMCA 205.
7. Fans that are intended to operate only during emergency conditions.
8. Fans and fan arrays having a fan energy index (FEI) of not less than 1.00, or 0.95 for VAV systems, at the design point of operation, as determined in accordance with AMCA 208 by an approved, independent testing laboratory and labeled by the manufacturer. The FEI for fan arrays shall be calculated in accordance with AMCA 208 Annex C.

C403.8.4 Group R occupancy ((~~exhaust~~)) ventilation fan efficacy. The Group R occupancies of the building shall be provided with ventilation that meets the requirements of the *International Mechanical Code,* as applicable, or with other approved means of ventilation. Mechanical ventilation system fans with 400 cfm or less in capacity shall meet the efficacy requirements of Table C403.8.4 at one or more rating points. Air flow shall be tested in accordance with Home Ventilating Standard (HVI) Standard 916 and listed. Fan efficacy shall be listed or shall be derived from listed power and airflow. Fan efficacy for fully ducted HRV, ERV, balanced, and in-line fans shall be determined at a static pressure of not less than 0.2 inch w.c. Fan efficacy for other exhaust fans shall be determined at a static pressure of not less than 0.1 inch w.c.

Exceptions:

((~~1. Group R heat recovery ventilator and energy recovery ventilator fans that are less than 400 cfm.~~

~~2~~)) 1. Where whole house ventilation fans are integrated with forced-air systems that are tested and listed HVAC equipment, provided they are powered by an electronically commutated motor where required by Section C405.8.

((~~3~~)) 2. Domestic clothes dryer booster fans, domestic range rood exhaust fans, and domestic range booster fans that operate intermittently.

TABLE C403.8.4
GROUP R EXHAUST FAN EFFICACY

Fan location	((~~Air Flow Rate Minimum (cfm)~~))	Minimum Efficacy (cfm/watt)	Air Flow Rate ((~~Minimum~~)) (cfm)
Exhaust fan: Bathroom, utility room, whole house	((~~10~~))	2.8	< 90
Exhaust fan: Bathroom, utility room, whole house	((~~90~~))	3.5	((~~Any~~)) ≥ 90
In-line (single-port and multi-port) fans	((~~Any~~))	3.8	Any
ERV, HRV or balanced fan		1.2	Any

C403.8.5 Fan controls. Controls shall be provided for fans in accordance with Section C403.8.5.1 and as required for specific systems provided in Section C403.

C403.8.5.1 Fan airflow control. Each cooling system listed in Table C403.8.5.1 shall be designed to vary the indoor fan airflow as a function of load and shall comply with the following requirements:

1. Direct expansion (DX) and chilled water cooling units that control the capacity of the mechanical cooling directly based on space temperature shall have not fewer than two stages of fan control. Low or minimum speed shall not be greater than 66 percent of full speed. At low or minimum speed, the fan system shall draw not more than 40 percent

of the fan power at full fan speed. Low or minimum speed shall be used during periods of low cooling load and ventilation-only operation.

2. Other units including DX cooling units and chilled water units that control the space temperature by modulating the airflow to the space shall have modulating fan control. Minimum speed shall be not greater than 50 percent of full speed. At minimum speed, the fan system shall draw no more than 30 percent of the power at full fan speed. Low or minimum speed shall be used during periods of low cooling load and ventilation-only operation.
3. Units that include an airside economizer in accordance with Section C403.5 shall have not fewer than two speeds of fan control during economizer operation.

Exceptions:

1. Modulating fan control is not required for chilled water and evaporative cooling units with fan motors of less than 1 hp (0.746 kW) where the units are not used to provide ventilation air and the indoor fan cycles with the load.
2. Where the volume of outdoor air required to comply with the ventilation requirements of the *International Mechanical Code* at low speed exceeds the air that would be delivered at the minimum speed defined in Section C403.8.5, the minimum speed shall be selected to provide the required *ventilation air*.

TABLE C403.8.5.1
FAN CONTROL

Cooling System Type	Fan Motor Size	Mechanical Cooling Capacity
DX cooling	Any	≥ 42,000 Btu/h
Chilled water and evaporative cooling	≥ 1/4 hp	Any

C403.9 Heat rejection and heat recovery equipment.

C403.9.1 Heat rejection equipment. Heat rejection equipment, including air-cooled condensers, dry coolers, open-circuit cooling towers, closed-circuit cooling towers and evaporative condensers, shall comply with this section.

Exception: Heat rejection devices where energy use is included in the equipment efficiency ratings listed in Tables C403.3.2(1)A, C403.3.2(1)B, C403.3.2(1)C, C403.3.2(2), C403.3.2(3), C403.3.2(7) and C403.3.2(9).

Heat rejection equipment shall have a minimum efficiency performance not less than values specified in Table C403.3.2(8).

Cooling towers serving chilled water systems shall be selected to maintain a return condenser water temperature to the tower of 86°F (30°C) or less at peak design conditions.

Exception: In existing buildings where physical constraints preclude a change from the original design, replacement cooling towers of the same or smaller capacity are exempt from this requirement.

Single-pass water cooling systems that use domestic water only one time before dumping it to waste shall not be used for hydronic heat pump and other cooling and refrigeration equipment, including but not limited to icemakers and walk-in coolers.

Exceptions:

1. Replacement of existing icemakers is exempt from this requirement.
2. Use of single-pass cooling for medical and dental equipment during power outages and other emergencies is exempt from this requirement.

C403.9.1.1 Fan speed control. Each fan powered by an individual motor or array of motors with a connected power, including the motor service factor, totaling 5 hp (3.7 kW) or more shall have controls and devices configured to automatically modulate the fan speed to control the leaving fluid temperature or condensing temperature and pressure of the heat rejection device. Fan motor power input shall be not more than 30 percent of design wattage at 50 percent of the design airflow.

Exceptions:

1. Fans serving multiple refrigerant or fluid cooling circuits.
2. Condenser fans serving flooded condensers. *

C403.9.1.2 Multiple-cell heat rejection equipment. Multiple-cell heat rejection equipment with variable speed fan drives shall be controlled to operate the maximum number of fans allowed that comply with the manufacturer's requirements for all system components and so that all fans can operate at the same fan speed required for the instantaneous cooling duty, as opposed to staged (on/off) operation. The minimum fan speed shall be the minimum allowable speed of the fan drive system in accordance with the manufacturer's recommendations.

C403.9.1.3 Limitation on centrifugal fan open-circuit cooling towers. Centrifugal fan open-circuit cooling towers with a combined rated capacity of 1,100 gpm (4164 L/m) or greater at 95°F (35°C) condenser water return, 85°F (29°C) con-

denser water supply, and 75°F (24°C) outdoor air wet-bulb temperature shall meet the energy efficiency requirement for axial fan open-circuit cooling towers listed in Table C403.3.2(8).

C403.9.1.4 Tower flow turndown. Open-circuit cooling towers used on water-cooled chiller systems that are configured with multiple- or variable-speed condenser water pumps shall be designed so that all open circuit cooling tower cells can be run in parallel with the larger of the flow that is produced by the smallest pump at its minimum expected flow rate or at 50 percent of the design flow for the cell.

C403.9.2 Heat recovery.

C403.9.2.1 Heat recovery for service water heating. Condenser heat recovery shall be installed for heating or reheating of service hot water provided the facility operates 24 hours a day, the total installed heat capacity of water cooled systems exceeds 1,500,000 Btu/hr of heat rejection, and the design service water heating load exceeds 250,000 Btu/hr.

The required heat recovery system shall have the capacity to provide the smaller of:

1. Sixty percent of the peak heat rejection load at design conditions; or
2. The preheating required to raise the peak service hot water draw to 85°F (29°C).

Exceptions:

1. Facilities that employ condenser heat recovery for space heating or reheat purposes with a heat recovery design exceeding 30 percent of the peak water-cooled condenser load at design conditions.
2. Facilities that provide 60 percent of their service water heating from on-site solar thermal or site recovered energy.

C403.9.2.2 Steam condensate systems. On-site steam heating systems shall have condensate water ((~~heat~~)) recovery. On-site includes a system that is located within or adjacent to one or more buildings within the boundary of a contiguous area or campus under one ownership and which serves one or more of those buildings.

Buildings using steam generated off-site with steam heating systems which do not have condensate water recovery shall have condensate ((~~water~~)) heat recovery.

C403.9.2.3 Refrigeration condenser heat recovery. Facilities having food service, meat or deli departments and having 500,000 Btu/h or greater of remote refrigeration condensers shall have condenser waste heat recovery from freezers and coolers and shall use the waste heat for service water heating, space heating or for dehumidification reheat. Facilities having a gross *conditioned floor area* of 40,000 ft^2 or greater and 1,000,000 Btu/h or greater of remote refrigeration shall have condenser waste heat recovery from freezers and coolers and shall use the waste heat for service water heating, and either for space heating or for dehumidification reheat for maintaining low space humidity. The required heat recovery system shall have the capacity to provide the smaller of:

1. 60 percent of the peak heat rejection load at design conditions; or
2. 50 percent of the sum of the service water heating load plus space heating load.

C403.9.2.4 Heat recovery for space heating. A water-source condenser heat recovery system meeting the requirements of Sections C403.9.2.4.1 through C403.9.2.4.4 shall be installed to serve space and ventilation heating systems in new buildings and additions meeting the following criteria:

1. The facility operates greater than 70 hours per week.
2. The sum of all heat rejection equipment capacity serving the new building or addition exceeds 1,500,000 BTU/hr.
3. The sum of zone minimum airflows in all zones with zone reheat coils divided by the *conditioned floor area* served by those systems is at least 0.45 cfm per square foot.

Exception: Systems complying with Section C403.3.5, Dedicated outdoor air systems (DOAS).

C403.9.2.4.1 Water to water heat recovery. Ninety percent (90%) of the total building space and ventilation heating system design load shall be served by systems that include heat recovery chiller or water to water heat pump equipment capable of rejecting heat from the cooling loop to the space and ventilation heating loop as the first stage of heating.

C403.9.2.4.2 Exhaust heat recovery. Heat shall be recovered by the heat recovery system from 90 percent of the total building exhaust airflow. The maximum leaving air temperature of exhaust air after heat recovery shall be 55°F dry-bulb when operating at full capacity in heat recovery mode.

Exceptions:

1. Where energy recovery systems are restricted by Section 514 of the *International Mechanical Code* to sensible energy, those systems shall not be included in the calculation of total building exhaust airflow.
2. Exhaust air systems handling contaminated airstreams that are regulated by applicable codes or accreditation standards and pose a health risk to maintenance personnel to maintain heat recovery devices, those systems shall not be included in the calculation of total building exhaust airflow.

Where located within conditioned space, return or exhaust air ducts that convey return or exhaust air downstream of an energy recovery media shall be insulated with a minimum *R*-value in accordance with Table C403.10.1.2.

All ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the *International Mechanical Code.*

TABLE C403.10.1.2
SUPPLY, RETURN, EXHAUST, and RELIEF AIR DUCTWORK INSULATION

Duct system	Duct Location and Use	Climate Zone	Minimum Installed Duct Insulation R-value[a,b]	Notes
Supply Air or Return Air	Outside the building (outdoors and exposed to weather)[c]	4C	R-8	See Section C403.10.1.2 for details
Supply Air or Return Air	Outside the building (outdoors and exposed to weather)[c]	5B	R-12	See Section C403.10.1.2 for details
Supply Air or Return Air	Unconditioned space (enclosed but not in the building conditioned envelope)	4C and 5B	R-6	See Section C403.10.1.2 for details
Supply Air or Return Air	Unconditioned space where the duct conveys air that is within 15°F of the air temperature of the surrounding unconditioned space	4C and 5B	R-3.3	See IMC Section 603.12 for additional requirements for condensation control at ductwork
Supply Air or Return Air	Where located in a building envelope assembly	4C and 5B	R-16	Duct or plenum is separated from building envelope assembly with the minimum insulation value
Supply Air	Within conditioned space where the supply duct conveys air that is less than 55°F or greater than 105°F	4C and 5B	R-3.3	See Section C403.10.1.2 for details
Supply Air	Within conditioned space that the duct directly serves where the supply duct conveys air that is less than 55°F or greater than 105°F	4C and 5B	None	See Section C403.10.1.2 for details
Supply Air	Within conditioned space where the supply duct conveys air that is 55°F or greater and 105 °F or less	4C and 5B	None	
Return or Exhaust Air	Within conditioned space, downstream of an energy recovery media, upstream of an *automatic* shutoff damper	4C	R-8	
Return or Exhaust Air	Within conditioned space, downstream of an energy recovery media, upstream of an *automatic* shutoff damper	5B	R-12	
Relief or Exhaust Air	Conditioned space and downstream of an *automatic* shutoff damper	4C and 5B	R-16	

a. Insulation *R*-values, measured in h·ft2·°F/Btu, are for the insulation as installed and do not include film resistance. The required minimum thicknesses do not consider water vapor transmission and possible surface condensation. Insulation resistance measured on a horizontal plane in accordance with ASTM C518 at a mean temperature of 75°F at the installed thickness.

b. See International Mechanical Code Sections 603.12 and 604 for further details on duct insulation requirements.

c. Includes attics above insulated ceilings, parking garages and crawl spaces.

C403.10.2 Duct construction. Ductwork shall be constructed and erected in accordance with the *International Mechanical Code.* For the purposes of this section, longitudinal seams are joints oriented in the direction of airflow. Transverse joints are connections of two duct sections oriented perpendicular to airflow. Duct wall penetrations are openings made by any screw, fastener, pipe, rod or wire. All other connections are considered transverse joints, including but not limited to spin-ins, taps and other branch connections, access door frames and jambs, and duct connections to equipment.

C403.10.2.1 Low-pressure duct systems. Longitudinal and transverse joints, seams and connections of supply and return ducts operating at a static pressure less than or equal to 2 inches water gauge (w.g.) (500 Pa) shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus embedded-fabric systems or tapes installed in accordance with the manufacturer's installation instructions. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code.*

Exception: Continuously welded and locking-type longitudinal joints and seams on ducts operating at static pressures less than 2 inches water gauge (w.g.) (500 Pa) pressure classification.

C403.10.2.2 Medium-pressure duct systems. Ducts and plenums designed to operate at a static pressure greater than 2 inches water gauge (w.g.) (500 Pa) but less than 3 inches w.g. (750 Pa) shall be insulated and sealed in accordance with

Section C403.10.1. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code*.

C403.10.2.3 High-pressure and exterior duct systems. Ducts designed to operate at static pressures equal to or greater than 3 inches water gauge (w.g.) (750 Pa) and all supply and return ductwork located outside the *building thermal envelope* that serves a *conditioned space* shall be insulated and sealed in accordance with Section C403.10.1. In addition, ducts and plenums shall be leak-tested in accordance with the SMACNA *HVAC Air Duct Leakage Test Manual* and shown to have a rate of air leakage (*CL*) less than or equal to 4.0, regardless of the Design Construction Pressure Class level, as determined in accordance with Equation 4-9. Ducts shall be tested using a pressure equal to the average operating pressure or the design Duct Construction Pressure Class level in accordance with the SMACNA HVAC Air Duct Leakage Test Manual.

$$CL = F/P^{0.65} \qquad \textbf{(Equation 4-9)}$$

Where:

F = The measured leakage rate in cfm per 100 square feet of duct surface.

P = The static pressure of the test.

Documentation shall be furnished by the designer demonstrating that representative sections totaling at least 25 percent of the duct area have been tested and that all tested sections meet the requirements of this section.

C403.10.3 Piping insulation. All piping, other than refrigerant piping, serving as part of a heating or cooling system shall be thermally insulated in accordance with Table C403.10.3.

Exceptions:

1. Factory-installed piping within HVAC equipment tested and rated in accordance with a test procedure referenced by this code.
2. Factory-installed piping within room fan-coils and unit ventilators tested and rated according to AHRI 440 (except that the sampling and variation provisions of Section 6.5 shall not apply) and 840, respectively.
3. Piping that conveys fluids that have a design operating temperature range between 60°F (15°C) and 105°F (41°C).
4. Piping that conveys fluids that have not been heated or cooled through the use of fossil fuels or electric power.
5. Strainers, control valves, and balancing valves associated with piping 1 inch (25 mm) or less in diameter.
6. Direct buried piping that conveys fluids at or below 60°F (15°C).

TABLE C403.10.3
MINIMUM PIPE INSULATION THICKNESS (thickness in inches)[a]

FLUID OPERATING TEMPERATURE RANGE AND USAGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (inches)				
	Conductivity Btu • in./(h · ft^2 • °F)[b]	Mean Rating Temperature, °F	< 1	1 to < 1-1/2	1-1/2 to < 4	4 to < 8	≥ 8
> 350	0.32 – 0.34	250	4.5	5.0	5.0	5.0	5.0
251 – 350	0.29 – 0.32	200	3.0	4.0	4.5	4.5	4.5
201 – 250	0.27 – 0.30	150	2.5	2.5	2.5	3.0	3.0
141 – 200	0.25 – 0.29	125	1.5	1.5	2.0	2.0	2.0
105 – 140	0.21 – 0.28	100	1.0	1.0	1.5	1.5	1.5
40 – 60	0.21 – 0.27	75	0.5	0.5	1.0	1.0	1.0
< 40	0.20 – 0.26	75	0.5	1.0	1.0	1.0	1.5

a. For piping smaller than 1-1/2 inch (38 mm) and located in partitions within *conditioned spaces*, reduction of these thicknesses by 1 inch (25 mm) shall be permitted (before thickness adjustment required in footnote b) but not to a thickness less than 1 inch (25 mm).

b. For insulation outside the stated conductivity range, the minimum thickness (T) shall be determined as follows:

$$T = r\{(1 + t/r)^{K/k} - 1\}$$

where:

T = minimum insulation thickness,

r = actual outside radius of pipe,

t = insulation thickness listed in the table for applicable fluid temperature and pipe size,

K = conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (Btu × in/h × ft^2 × °F) and

k = the upper value of the conductivity range listed in the table for the applicable fluid temperature.

c. For direct-buried heating and hot water system piping, reduction of these thicknesses by 1-1/2 inches (38 mm) shall be permitted (before thickness adjustment required in footnote b but not to thicknesses less than 1 inch (25 mm).

C403.10.3.1 Protection of piping insulation. Piping insulation exposed to weather shall be protected from damage, including that due to sunlight, moisture, equipment maintenance and wind, and shall provide shielding from solar radiation that can cause degradation of the material. ((~~Adhesives~~)) Adhesive tape shall not be permitted.

C403.10.4 Insulation of refrigerant piping. Refrigerant piping, other than piping factory installed in HVAC equipment, shall have minimum 1/2-inch insulation within conditioned spaces and 1-inch insulation outside of conditioned spaces, at a conductivity rating of 0.21 to 0.26 Btu x in/(h x ft^2 x °F) with a mean temperature rating of 75°F.

C403.11 Mechanical systems located outside of the building thermal envelope. Mechanical systems providing heat outside of the thermal envelope of a building shall be configured to comply with Section C403.11.1 through C403.11.3.

C403.11.1 Heating outside a building or in unheated spaces. Systems installed to provide heat outside a building or in unheated spaces shall be radiant systems.

Such heating systems shall be controlled by an occupancy sensing device or a timer switch, so that the system is automatically deenergized when no occupants are present in the area heated by each individual device for a period not to exceed 20 minutes.

C403.11.2 Snow- and ice-melt system controls. Snow- and ice-melting systems, supplied through energy service to the building, shall include *automatic* controls configured to shut off the system when the pavement temperature is above 50°F (10°C) and no precipitation is falling and an *automatic* control that is configured to shut off when the outdoor temperature is above 40°F (4°C) so that the potential for snow or ice accumulation is negligible.

C403.11.3 Freeze protection system controls. Freeze protection systems, such as heat tracing of outdoor piping and heat exchangers, including self-regulating heat tracing, shall include *automatic* controls configured to shut off the systems when outdoor air temperatures are above 40°F (4°C) or when the conditions of the protected fluid will prevent freezing.

C403.12 High efficiency single-zone variable air volume (VAV) systems. For HVAC systems subject to the requirements of Section C403.3.5 but utilizing Exception 2 of that section, a high efficiency single-zone VAV system may be provided without a separate parallel DOAS when the system is designed, installed, and configured to comply with all of the following criteria (this ((~~exception~~)) option shall not be used as a substitution for a DOAS per Section C406.6 or as a modification to the requirements for the *Standard Reference Design* in accordance with Section C407):

1. The single-zone VAV system is provided with airside economizer in accordance with Section 403.3 without exceptions.
2. A direct-digital control (DDC) system is provided to control the system as a single zone in accordance with Section C403.4.11 regardless of sizing thresholds of Table C403.4.11.1.
3. Single-zone VAV systems with a minimum outdoor air requirement of 1,000 cfm (472 L/s) or greater shall be equipped with a device capable of measuring outdoor airflow intake under all load conditions. The system shall be capable of increasing or reducing the outdoor airflow intake based on Section C403.7.1, Demand controlled ventilation.
4. Allowable fan motor horsepower shall not exceed 90 percent of the allowable HVAC *fan system bhp* (Option 2) as defined by Section C403.8.1.1.
5. Each single-zone VAV system shall be designed to vary the supply fan airflow as a function of heating and cooling load and minimum fan speed shall not be more than the greater of:
   - 5.1. 30 percent of peak design airflow; or
   - 5.2. The required ventilation flow assuming no occupants.
6. Spaces that are larger than 150 square feet (14 m^2) and with an occupant load greater than or equal to 25 people per 1000 square feet (93 m^2) of floor area (as established in Table 403.3.1.1 of the *International Mechanical Code*) shall be provided with all of the following features:
   - 6.1. Demand control ventilation (DCV) shall be provided that utilizes a carbon dioxide sensor to reset the ventilation set point of the single-zone VAV system from the design minimum to design maximum ventilation rate as required by Chapter 4 of the *International Mechanical Code.*
   - 6.2. Occupancy sensors shall be provided that are configured to reduce the minimum ventilation rate to zero and setback room temperature set points by a minimum of 5°F, for both cooling and heating, when the space is unoccupied.
7. Single-zone VAV systems shall comply with one of the following options:
   - 7.1. Single-zone VAV air handling units with a hydronic heating coil connected to systems with hot water generation equipment limited to the following types of equipment: gas-fired hydronic boilers with a thermal efficiency, Et, of not less than 92 percent, air-to-water heat pumps or heat recovery chillers. Hydronic heating coils shall be sized for a maximum entering hot water temperature of 120°F for peak anticipated heating load conditions.
   - 7.2. Single-zone VAV air handing units with a chilled water coil connected to systems with chilled water generation equipment with IPLV values more than 25 percent higher than the minimum part load efficiencies listed in Table C403.3.2(7), in the appropriate size category, using the same test procedures. Equipment shall be listed in the appropriate certification program to qualify. The smallest chiller or compressor in the central plant shall not exceed 20 percent of the total central plant cooling capacity or the chilled water system shall include thermal storage sized for a minimum of 20 percent of the total central cooling plant capacity.

7.3. Single-zone VAV air handling units with DX cooling, heat pump heating or gas-fired furnace shall comply with the following requirements as applicable:

7.3.1. Have a DX cooling coil with cooling part load efficiency that are a minimum of 15 percent higher than the minimum SEER or IEER listed in Tables C403.3.2(1) and C403.3.2(2).

7.3.2. Have a gas-fired furnace with a thermal efficiency, Et, of not less than 90 percent or heat pump with a minimum heating HSPF or COP efficiency that are a minimum of 10 percent higher than the minimum heating efficiency in Tables C403.3.2(1) and C403.3.2(2).

7.3.3. Heating coils or burner output shall be modulating or have a minimum of 2 stages with the first stage being less than 50 percent of total heating capacity. Cooling coils shall be modulating or have a minimum of 2 stages with the first stage being less than 50 percent of the total cooling capacity.

8. The DDC system shall include a fault detection and diagnostics (FDD) system complying with the following:

8.1. The following temperature sensors shall be permanently installed to monitor system operation:

8.1.1. Outside air.

8.1.2. Supply air.

8.1.3. Return air.

8.2. Temperature sensors shall have an accuracy of ±2°F (1.1°C) over the range of 40°F to 80°F (4°C to 26.7°C).

8.3. The single-zone VAV air handling unit controller shall be configured to provide system status by indicating the following:

8.3.1. Free cooling available.

8.3.2. Economizer enabled.

8.3.3. Compressor enabled.

8.3.4. Heating enabled.

8.3.5. Mixed air low limit cycle active.

8.3.6. The current value of each sensor.

8.4. The single-zone VAV air handling unit controller shall be capable of manually initiating each operating mode so that the operation of compressors, economizers, fans and the heating system can be independently tested and verified.

8.5. The single-zone VAV air handling unit shall be configured to report faults to a fault management application able to be accessed by day-to-day operating or service personnel or annunciated locally on zone thermostats.

8.6. The FDD system shall be configured to detect the following faults:

8.6.1. Air temperature sensor failure/fault.

8.6.2. Not economizing when the unit should be economizing.

8.6.3. Economizing when the unit should not be economizing.

8.6.4. Outdoor air or return air damper not modulating.

8.6.5. Excess outdoor air.

C403.13 Commissioning. Mechanical systems shall be commissioned in accordance with Section C408.

C403.14 Compressed air and vacuum air. Compressed air and vacuum air systems shall comply with all of the following:

Exception: Compressed air and vacuum air systems used for medical purposes are exempt from this section.

1. Air Compressors (50-150 PSI), General: Air compressors operating at 50-150 PSI shall comply with the following:

a. All water drains shall be “no air loss” drains.

b. Timed unheated desiccant air driers shall not be allowed.

2. Rotary Screw Air Compressors over 10 hp (50-150 PSI): Rotary screw air compressors over 10 hp operating at 50-150 PSI shall not rely on modulation control and shall have one of the following:

a. Receiver capacity greater than three gallons per cfm to allow efficient load/unload control;

b. Variable speed drive controlled air compressor; or

c. Multiple air compressors using a smaller trim-air compressor to trim. The trim compressor shall use variable speed drive control, or shall use load/unload control with greater than three gallon receiver capacity per cfm for the trim air compressor.

C403.15 Commercial food service. The following types of equipment within the scope of the applicable Energy Star program shall comply with the energy-efficiency and water-efficiency criteria required to achieve the Energy Star label:

1. Commercial fryers: Energy Star Program Requirements for Commercial Fryers.

2. Commercial hot food holding cabinets: Energy Star Program Requirements for Hot Food Holding Cabinets.
3. Commercial steam cookers: Energy Star Program Requirements for Commercial Steam Cookers.
4. Commercial dishwashers: Energy Star Program Requirements for Commercial Dishwashers.

SECTION C404
SERVICE WATER HEATING AND PRESSURE-BOOSTER SYSTEMS

C404.1 General. This section covers the minimum efficiency of, and controls for, service water-heating equipment and insulation of service hot water piping.

C404.2 Service water-heating equipment performance efficiency. Water-heating equipment and hot water storage tanks shall meet the requirements of Table C404.2. The efficiency shall be verified through certification and *listed* under an *approved* certification program, or if no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the manufacturer. Water-heating equipment intended to be used to provide space heating shall meet the applicable provisions of Table C404.2.

TABLE C404.2
MINIMUM PERFORMANCE OF WATER-HEATING EQUIPMENT

EQUIPMENT TYPE	SIZE CATEGORY (input)	SUBCATEGORY OR RATING CONDITION	PERFORMANCE REQUIRED[a, b]	TEST PROCEDURE
Water heaters, electric	≤ 12 kW[d]	Tabletop[e], ≥ 20 gal and < 120 gal	0.93 - 0.00132*V*, EF	DOE 10 CFR Part 430
		Resistance ≥ 20 gal and ≤ 55 gal	0.960 - 0.0003*V*, EF	
		Grid-enabled[f] > 75 gal and ≤ 120 gal	1.061 - 0.00168*V*, EF	
	> 12 kW	Resistance ≥ 20 gal	(((~~(0.3 + 27)/V_m, %/h[g]~~)) (0.3 + 27/V_m), %/h[g]	Section G.2 of ANSI Z21.10.3
	≤ 24 amps and ≤ 250 volts	Heat pump	2.057 - 0.00113*V*, EF	DOE 10 CFR Part 430
Instantaneous water heaters, electric	All	Resistance	0.93 - 0.00132*V*, EF	DOE 10 CFR Part 430
Storage water heaters, gas	≤ 75,000 Btu/h	≥ 20 gal and ≤ 55 gal	0.675 - 0.0015*V*, EF	DOE 10 CFR Part 430
		> 55 gal and ≤ 100 gal	0.8012 - 0.00078*V*, EF	
	> 75,000 Btu/h	< 4,000 Btu/h/gal	80% E_t (Q/800 + 110 $\sqrt{V}$)SL, Btu/h	Section G.1 and G.2 of ANSI Z21.10.3
Instantaneous water heaters, gas	> 50,000 Btu/h and < 200,000 Btu/h	≥ 4,000 Btu/h/gal and < 2 gal	0.82 - 0.0019*V*, EF	DOE 10 CFR Part 430
	≥ 200,000 Btu/h[c]	≥ 4,000 Btu/h/gal and < 10 gal	80% E_t	Section G.1 and G.2 of ANSI Z21.10.3
	≥ 200,000 Btu/h	≥ 4,000 Btu/h/gal and ≥ 10 gal	80% E_t (Q/800 + 110 $\sqrt{V}$)SL, Btu/h	
Storage water heaters, oil	≤ 105,000 Btu/h	≥ 20 gal	0.68 - 0.0019*V*, EF	DOE 10 CFR Part 430
	> 105,000 Btu/h	< 4,000 Btu/h/gal	80% E_t (Q/800 + 110 $\sqrt{V}$)SL, Btu/h	Section G.1 and G.2 of ANSI Z21.10.3
Instantaneous water heaters, oil	≤ 210,000 Btu/h	≥ 4,000 Btu/h/gal and < 2 gal	0.59 - 0.0019*V*, EF	DOE 10 CFR Part 430
	> 210,000 Btu/h	≥ 4,000 Btu/h/gal and < 10 gal	80% E_t	Section G.1 and G.2 of ANSI Z21.10.3
	> 210,000 Btu/h	≥ 4,000 Btu/h/gal and ≥ 10 gal	78% E_t (Q/800 + 110 $\sqrt{V}$)SL, Btu/h	
Hot water supply boilers, gas and oil	≥ 300,000 Btu/h and < 12,500,000 Btu/h	≥ 4,000 Btu/h/gal and < 10 gal	80% E_t	Section G.1 and G.2 of ANSI Z21.10.3
Hot water supply boilers, gas	≥ 300,000 Btu/h and < 12,500,000 Btu/h	≥ 4,000 Btu/h/gal and ≥ 10 gal	80% E_t (Q/800 + 110 $\sqrt{V}$)SL, Btu/h	
Hot water supply boilers, oil	> 300,000 Btu/h and < 12,500,000 Btu/h	> 4,000 Btu/h/gal and > 10 gal	78% E_t (Q/800 + 110 $\sqrt{V}$)SL, Btu/h	
Pool heaters, gas and oil	All	—	82% E_t	ASHRAE 146
Heat pump pool heaters	All	—	4.0 COP	AHRI 1160
Unfired storage tanks[h]	All	—	Minimum insulation requirement R-12.5 (h × ft² × °F)/Btu	(none)

For SI: °C = [(°F) - 32]/1.8, 1 British thermal unit per hour = 0.2931 W, 1 gallon = 3.785 L, 1 British thermal unit per hour per gallon = 0.078 W/L.

a. Energy factor (EF) and thermal efficiency (E_t) are minimum requirements. In the EF equation, *V* is the rated volume in gallons.

b. Standby loss (SL) is the maximum Btu/h based on a nominal 70°F temperature difference between stored water and ambient requirements. In the SL equation, Q is the nameplate input rate in Btu/h. In the SL equation for electric water heaters, *V* is the rated volume in gallons and Vm is the measured volume in gallons. In the SL equation for oil and gas water heaters and boilers, *V* is the rated volume in gallons.

c. Instantaneous water heaters with input rates below 200,000 Btu/h must comply with these requirements if the water heater is designed to heat water to temperatures 180°F or higher.

d. Electric water heaters with an input rating of 12kW (40,950 Btu/h) or less that are designed to heat water to temperatures of 180°F or greater shall comply with the requirements for electric water heaters that have an input rating greater than 12 kW.

e. A tabletop water heater is a water heater that is enclosed in a rectangular cabinet with a flat top surface not more than three feet (0.91 m) in height.

f. A grid-enabled water heater is an electric resistance water heater that meets all of the following:

1. Has a rated storage tank volume of more than 75 gallons.
2. Is manufactured on or after April 16, 2015.
3. Is equipped at the point of manufacture with an activation lock.
4. Bears a permanent label applied by the manufacturer that complies with all of the following:

4.1 Is made of material not adversely affected by water.

4.2 Is attached by means of non-water soluble adhesive.

4.3 Advises purchasers and end-users of the intended and appropriate use of the product with the following notice printed in 16.5 point Arial Narrow Bold font: "IMPORTANT INFORMATION: This water heater is intended only for use as a part of an electric thermal storage or demand response program. It will not provide adequate hot water unless enrolled in such a program and activated by your utility company or another program operator. Confirm the availability of a program in your local area before purchasing or installing this product."

g. %/h is the energy consumed to replace the heat lost from the tank while on standby, expressed as a percentage of the total energy in the stored water per hour.

h. In accordance with Section C404.6.1.

C404.2.1 High input-rated service water heating systems for other than Group R-1 and R-2 occupancies. In new buildings where the combined input rating of the water-heating equipment serving other than Group R-1 and R-2 occupancies installed in a building is equal to or greater than 1,000,000 Btu/h (293 kW), the combined input-capacity-weighted-average efficiency of water-heating equipment shall be no less than the following for each water heating fuel source:

1. Electric: A rated COP of not less than 2.0. For air-source heat pump equipment, the COP rating will be reported at the design leaving heat pump water temperature with an entering air temperature of 60°F (15.6°C) or less.
2. Fossil Fuel: A rated E_t of not less than 90 percent as determined by the applicable test procedures in Table C404.2.

SDCI Informative Note: Section C404.2.1 will remain in force only until December 31, 2021.

Exceptions:

1. Permits applied for on or after January 1, 2022.

((~~1~~)) 2. Where not less than 25 percent of the annual service water-heating requirement is provided from any of the following sources:

((~~1.1~~)) 2.1. Renewable energy generated on site that is not being used to satisfy another requirement of this code; or

((~~1.2~~)) 2.2. Site recovered energy that is not being used to satisfy other requirements of this code.

((~~2~~)) 3. Redundant equipment intended to only operate during equipment failure or periods of extended maintenance.

((~~3~~)) 4. Electric resistance heated systems installed as part of an alteration where the water heating equipment is installed at the grade level in a building with a height of four stories or greater.

((~~4~~)) 5. Hot water heat exchangers used to provide service water heating from a district utility (steam, heating hot water).

((~~5~~)) 6. Water heaters provided as an integral part of equipment intended to only heat or boost the heat of water used by that equipment.

((~~6~~)) 7. For electric heat systems, supplemental water heaters not meeting this criteria that function as auxiliary heating only when the outdoor temperature is below 32°F (0°C) or when a defrost cycle is required are not required to have a rated COP of 2.0. Such systems shall be sized and configured to lock out electric resistance or fossil fuel heating from operation when the outdoor temperature is above 32°F (0°C) unless the system is in defrost operation.

8. Electric instantaneous water heaters that serve toilet room handwashing lavatory faucets or kitchenette sink faucets without service water heating circulation systems and without water storage.

C404.2.2 High input-rated service water heating system for Group R-1 and R-2 occupancies.

SDCI Informative Note: Section C404.2.2 will remain in force only until December 31, 2021.

In new buildings with over 1,000,000 Btu/h installed service water heating capacity serving Group R-1 and R-2 occupancies, at least 25 percent of annual water heating energy shall be provided from any combination of the following water heating sources:

1. Renewable energy generated on site that is not being used to satisfy other requirements of this code; or
2. Site-recovered energy that is not being used to satisfy other requirements of this code.

Exceptions:

1. Permits applied for on or after January 1, 2022.
2. Compliance with this section is not required if the combined input-capacity-weighted average equipment rating for each service water heating fuel source type is not less than the following:
   2.1. Electric Resistance: An electric resistance water heater water with a rating of 105% of the rated efficiency of Table C404.2.
   2.2. Electric Heat Pump (10 CFR Part 430): A heat pump water heater rated in accordance with 10 CFR Part 430 with a rating of 105% of the rated efficiency of Table C404.2.
   2.3. Electric Heat Pump (not listed in accordance with 10 CFR Part 430): A heat pump water heater not rated in accordance with 10 CFR Part 430 shall have a COP of not less than 2.0. For air-source heat pump equipment the COP rating will be reported at the design leaving heat pump water temperature with an entering air temperature of 60°F (15.6°C) or less. Supplemental water heaters not meeting the above criteria that function as auxiliary heating only when the outdoor temperature is below 32°F (0°) or when a defrost cycle is required are not required to have a rated COP of 2.0. Such systems shall be sized and configured to lock out electric resistance or fossil fuel heating from operation when the outdoor temperature is above 32°F (0°C) unless the system is in defrost operation.
   2.4. Fossil Fuels: A rated Et of not less than 90% as determined by the applicable test procedures in Table C404.2.
   2.5. Hot water heat exchangers used to provide service water heating from a district utility (steam, heating hot water).

C404.2.3 Group R-1 and R-2 occupancies with central service water heating systems. In buildings with central service water heating systems serving four or more Group R-1 or R-2 dwelling or sleeping units, the primary water heating equipment shall not use fossil fuel combustion or electric resistance. Service hot water shall be provided by an air-source heat pump water heating (HPWH) system meeting the requirements of this section. Supplemental service water heating equipment is permitted to use electric resistance in compliance with Section C404.2.3.4.

Exceptions:

1. Permits applied for prior to January 1, 2022.
2. Solar thermal, wastewater heat recovery, other *approved* waste heat recovery, ground source heat pump, water-source heat pump system utilizing waste heat, and combinations thereof, are permitted to offset all or any portion of the required HPWH capacity where such systems comply with this code and the Seattle Plumbing Code.
3. Systems meeting the requirements of the Northwest Energy Efficiency Alliance (NEEA) Advanced Water Heater Specifications for central service water heating systems.

SDCI Informative Note: As of the publication of this code, publication of the NEEA AWHS for central service water heating systems is still pending. See https://neea.org/resources/advanced-water-heating-specification for updated information.

C404.2.3.1 Primary heat pump system sizing. The system shall include a primary service minimum output at 40°F outdoor air temperature that provides sufficient hot water for R-1 and/or R-2 occupancy uses as calculated using the equipment manufacturer's selection criteria or another *approved* methodology. Air source heat pumps shall be sized to deliver no less than 50 percent of the calculated demand for hot water production during the peak demand period when entering air temperature is 24°F.

Exception: 50 percent sizing at 24°F is not required for heat pumps located in a below-grade enclosed parking structure or other ventilated and unconditioned space that is not anticipated to fall below 40°F at any time.

SDCI Informative Note: Estimates of the appropriate heat pump system sizing and hot water storage volume for HPHW systems, calculated per bedroom or per occupant, vary widely, depending on type of use, output capacity of the heat pumps, and other factors.

C404.2.3.2 Primary hot water storage sizing. The system shall provide sufficient hot water, as calculated using an *approved* methodology, to satisfy peak demand period requirements.

C404.2.3.3 System design. The service water heating system shall be configured to conform to one of the following provisions:

1. For *single-pass* HPWHs, *temperature maintenance* heating provided for reheating return water from the building's heated water circulation system shall be physically decoupled from the primary service water heating system storage

tank(s) in a manner that prevents destratification of the primary system storage tanks. *Temperature maintenance* heating is permitted to be provided by electric resistance or a separate dedicated heat pump system.

2. For *multi-pass* HPWHs, recirculated *temperature maintenance* water is permitted to be returned to the primary water storage tanks for reheating.

C404.2.3.3.1 Mixing valve. A thermostatic mixing valve capable of supplying hot water to the building at the user temperature set point shall be provided, in compliance with requirements of the Seattle Plumbing Code and the HPWH manufacturer's installation guidelines. The mixing valve shall be sized and rated to deliver tempered water in a range from the minimum flow of the *temperature maintenance* recirculation system up to the maximum demand for the fixtures served.

C404.2.3.4 Supplemental water heaters. Total supplemental electric resistance water heating equipment shall not have an output capacity greater than the primary water heating equipment at 40°F entering air temperature. Supplemental electric resistance heating is permitted for the following uses:

1. *Temperature maintenance* of heated-water circulation systems, physically separate from the primary service water heating system. *Temperature maintenance* heating capacity shall be no greater than the primary water heating capacity at 40°F.
2. Defrost of compressor coils.
3. Heat tracing of piping for freeze protection or for *temperature maintenance* in lieu of recirculation of hot water.
4. Backup or low ambient temperature conditions, where all of the following are true:
   a. The supplemental heating capacity is no greater than the primary service water heating capacity at 40°F.
   b. During normal operations the supplemental heating is controlled to operate only when the entering air temperature at the air-source HPWH is below 40°F, and the primary HPWH compressor continues to operate together with the supplemental heating when the entering air temperature is between 17°F and 40°F.
   c. The primary water heating equipment cannot satisfy the system load due to equipment failure or entering air temperature below 40°F.
5. Supplemental heating downstream from a *multi-pass* HPWH system.
6. Stand-alone electric water heaters serving single zones not served by the central water heating system.

C404.2.3.5 Alarms. The control system shall be capable of and configured to send *automatic* error alarms to building or maintenance personnel upon detection of equipment faults, low leaving water temperature from primary storage tanks, or low hot water supply delivery temperature to building distribution system.

C404.3 Efficient heated water supply piping. Heated water supply piping shall be in accordance with Section C404.3.1 or C404.3.2. The flow rate through 1/4-inch (6.4 mm) piping shall be not greater than 0.5 gpm (1.9 L/m). The flow rate through 5/16-inch (7.9 mm) piping shall be not greater than 1 gpm (3.8 L/m). The flow rate through 3/8-inch (9.5 mm) piping shall be not greater than 1.5 gpm (5.7 L/m). Water heaters, circulating water systems and heat trace temperature maintenance systems shall be considered sources of heated water.

C404.3.1 Maximum allowable pipe length method. The maximum allowable piping length from the nearest source of heated water to the termination of the fixture supply pipe shall be in accordance with the following. Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table C404.3.1.

1. For a public lavatory faucet, use the "Public lavatory faucets" column in Table C404.3.1.
2. For all other plumbing fixtures and plumbing appliances, use the "Other fixtures and appliances" column in Table C404.3.1.

TABLE C404.3.1
PIPING VOLUME AND MAXIMUM PIPING LENGTHS

NOMINAL PIPE SIZE (inches)	VOLUME (liquid ounces per foot length)	MAXIMUM PIPING LENGTH (feet)	
		Public lavatory faucets	Other fixtures and appliances
1/4	0.33	6	50
5/16	0.5	4	50
3/8	0.75	3	50
1/2	1.5	((~~2~~)) 8	43
5/8	2	((~~1~~)) 8	32
3/4	3	0.5	21
7/8	4	0.5	16
1	5	0.5	13
1-1/4	8	0.5	8
1-1/2	11	0.5	6
2 or larger	18	0.5	4

C404.3.2 Maximum allowable pipe volume method. The water volume in the piping shall be calculated in accordance with Section C404.3.2.1. The volume from the nearest source of heated water to the termination of the fixture supply pipe shall be as follows:

1. For a public lavatory faucet: Not more than 2 ounces (0.06 L).
2. For other plumbing fixtures or plumbing appliances; not more than 0.5 gallon (1.89 L).

C404.3.2.1 Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the nearest source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from the "Volume" column in Table C404.3.1. The volume contained within fixture shutoff valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

C404.4 Heat traps for hot water storage tanks. Storage tank-type water heaters and hot water storage tanks that have vertical water pipes connecting to the inlet and outlet of the tank shall be provided with integral heat traps at ((~~those~~)) such vertical inlets and outlets or shall have pipe-configured heat traps in the piping connected to those inlets and outlets. Tank inlets and outlets associated with solar water heating system circulation loops shall not be required to have heat traps.

C404.5 Water heater installation. Electric water heaters in unconditioned spaces or on concrete floors shall be placed on an incompressible, insulated surface with a minimum thermal resistance of R-10.

C404.6 Insulation of piping. Piping from a water heater to the termination of the heated water fixture supply pipe shall be insulated in accordance with Table C403.10.3. On both the inlet and outlet piping of a storage hot water heater or heated water storage tank, the piping to a heat trap or the first 8 feet (2438 mm) of piping, whichever is less, shall be insulated. Piping that is heat traced shall be insulated in accordance with Table C403.10.3 or the heat trace manufacturer's instructions. Tubular pipe insulation shall be installed in accordance with the insulation manufacturer's instructions. Pipe insulation shall be continuous, including through hangers and supports, such that thermal bridging is prevented, except where the piping passes through a framing member. The minimum insulation thickness requirements of this section shall not supersede any greater insulation thickness requirements necessary for the protection of piping from freezing temperatures or the protection of personnel against external surface temperatures on the insulation.

Exception: Tubular pipe insulation shall not be required on the following:

1. The tubing from the connection at the termination of the fixture supply piping to a plumbing fixture or plumbing appliance.
2. Valves, pumps, strainers and threaded unions in piping that is 1 inch (25 mm) or less in nominal diameter.
3. Piping from user-controlled shower and bath mixing valves to the water outlets.
4. Cold-water piping of a demand recirculation water system.
5. Tubing from a hot drinking-water heating unit to the water outlet.
6. Piping at locations where a vertical support of the piping is installed.
7. Piping surrounded by building insulation with a thermal resistance (*R*-value) of not less than R-3.
8. Hot water piping that is part of the final pipe run to the plumbing fixture and is not part of the heated-water circulation system circulation path is not required to meet the minimum insulation requirements of Section C404.6.

C404.6.1 Storage tank insulation. Unfired storage tanks used to store service hot water at temperatures above 130°F shall be wrapped with an insulating product, installed in accordance with the insulation manufacturer's instructions and providing a minimum of R-2 additional insulation for every 10°F increase in stored water temperature above 130°F. Such additional insulation is also permitted to be integral to the tank. The insulation is permitted to be discontinuous at structural supports.

C404.7 Heated-water circulating and temperature maintenance systems. Heated-water circulation systems shall be in accordance with Section C404.7.1. Heat trace temperature maintenance systems shall be in accordance with Section C404.7.2. Controls for hot water storage shall be in accordance with Section C404.7.3. *Automatic* controls, temperature sensors and pumps shall be in a location with *access.* Manual controls shall be in a location with *ready access.*

C404.7.1 Circulation systems. Heated-water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe. Gravity and thermo-syphon circulation systems shall be prohibited. Controls shall start the pump based on the identification of a demand for hot water within the occupancy, according to the requirements of Sections C404.7.1.1 and C404.7.1.2.

C404.7.1.1 Single riser systems. Where the circulation system serves only a single domestic hot water riser or zone, the following controls shall be provided:

1. Control to automatically turn off the pump when the water in the circulation loop is at the supply temperature and shall not turn the pump back on until the temperature is a minimum of 10°F lower than the supply temperature or have controls equipped with *automatic* time switches or other controls that can be set to switch off the pump during unoccupied hours when hot water is not required.
2. Control shall be equipped with manual switch or other controls that can be used to turn off the pump during extended periods when hot water is not required.

C404.7.1.2 Multiple riser systems. Where the circulation system serves multiple domestic hot water risers or piping zones, controls shall be provided such that they can be set to switch off the pump during extended periods when hot water is not required. System shall include means for balancing the flow rate through each individual hot water supply riser or piping zone. For heated water circulation systems that have multiple risers and use a variable flow circulation pump, each riser shall have a self-actuating thermostatic balancing valve.

C404.7.1.3 Electronic thermostatic mixing valve (TMV). Where a heated water circulation system utilizes an electronic TMV to control the temperature of hot water supplied to the building, the TMV shall be configured so that it either reverts closed (fully COLD) or maintains its current valve position upon power failure or cessation of circulation flow.

C404.7.2 Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy. Heat trace shall be arranged to be turned off automatically when there is no hot water demand.

C404.7.3 Controls for hot water storage. The controls on pumps that circulate water between a water heater and a heated-water storage tank shall limit operation of the pump from heating cycle startup to not greater than 5 minutes after the end of the cycle.

C404.7.3.1 Pipe insulation. For heated water circulation systems, both supply and return pipe insulation shall be at minimum 1.0 inch thicker than that required by Table C403.10.3.

Exception: Where piping is centered within a wall, ceiling, or floor framing cavity with a depth at least 4 inches greater than the diameter of the pipe and that is completely filled with batt or blown-in insulation, additional pipe insulation is not required.

C404.8 Demand recirculation controls. *Demand recirculation water systems* ((~~shall have controls that comply with both of the following:~~)) are not permitted.

((~~1. The controls shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture fitting or appliance.~~

~~2. The controls shall limit the temperature of the water entering the cold water piping to not greater than 104°F (40°C)~~))

C404.9 Domestic hot water meters. Each individual dwelling unit in a Group R-2 occupancy with central service domestic hot water systems shall be provided with a domestic hot water meter to allow for domestic hot water billing based on actual domestic hot water usage.

Exception: Dwelling units in other than Group R-2 multi-family and live/work units are not required to provide domestic hot water metering at each dwelling unit where domestic hot water is metered separately for each of the following building end uses:

1. Dwelling units.
2. Sleeping units.
3. Commercial kitchens.

4. Central laundries.

C404.10 Drain water heat recovery units. Drain water heat recovery units shall comply with CSA B55.2. Potable water-side pressure loss shall be less than 10 psi (69 kPa) at maximum design flow. For Group R occupancies, the efficiency of drain water heat recovery unit efficiency shall be in accordance with CSA B55.1.

C404.11 Energy consumption of pools and permanent spas. The energy consumption of pools and permanent spas shall be controlled by the requirements in Sections C404.11.1 through C404.11.4.

C404.11.1 Heaters. Pool water heaters using electric resistance heating as the primary source of heat are prohibited for pools over 2,000 gallons. Heat pump pool heaters shall have a minimum COP of 4.0 at 50°F db, 44.2°F wb outdoor air and 80°F entering water, determined in accordance with ((~~ASHRAE Standard 146~~)) AHRI Standard 1160, Performance Rating of Heat Pump Pool Heaters. Other pool heating equipment shall comply with the applicable efficiencies in Section C404.2.

The electric power to all heaters shall be controlled by an on-off switch that is an integral part of the heater, mounted on the exterior of the heater, or external to and within 3 feet of the heater in a location with *ready access.* Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. Gas fired heaters shall not be equipped with constant burning pilot lights.

C404.11.2 Time switches. Time switches or other control methods that can automatically turn off and on heaters and pump motors according to a preset schedule shall be installed for heaters and pump motors. Heaters and pump motors that have built in time switches shall be in compliance with this section.

Exceptions:

1. Where public health standards require 24-hour pump operation.
2. Pumps that are required to operate solar- and waste-heat-recovery pool heating systems.

C404.11.3 Covers. Heated pools and in-ground permanent spas shall be provided with a vapor-retardant cover on or at the water surface. Pools heated to more than 90°F shall have a pool cover with a minimum insulation value of R-12, and the sides and bottom of the pool shall also have a minimum insulation value of R-12.

C404.11.4 Heat recovery. Heated indoor swimming pools, spas or hot tubs with water surface area greater than 200 square feet shall provide for energy conservation by an exhaust air heat recovery system that heats ventilation air, pool water or domestic hot water. The heat recovery system shall be configured to decrease the exhaust air temperature at design heating conditions (80°F indoor) by 36°F (10°C).

Exception: Pools, spas or hot tubs that include system(s) that provide equivalent recovered energy on an annual basis through one of the following methods:

1. Solar water heating systems not claimed in Section C406.5 or Section C407;
2. Dehumidification heat recovery;
3. Waste heat recovery; or
4. A combination of these system sources capable of and configured to provide at least 70 percent of the heating energy required over an operating season.

C404.12 Energy consumption of portable spas. The energy consumption of electric-powered portable spas shall be controlled by the requirements of APSP 14.

C404.13 Service water pressure-booster systems. Service water pressure-booster systems shall be designed and configured such that the following apply:

1. One or more pressure sensors shall be used to vary pump speed and/or start and stop pumps. The sensors shall either be located near the critical fixtures that determine the pressure required, or logic shall be employed that adjusts the set point to simulate operations of remote sensors.
2. No devices shall be installed for the purpose of reducing the pressure of all of the water supplied by any booster system pump or booster system, except for safety devices.
3. Booster system pumps shall not operate when there is no service water flow except to refill hydro pneumatic tanks.
4. Systems pump motors 7.5 hp and greater shall be provided with variable flow capacity in accordance with Section C403.2.3.

C404.14 Commissioning. Service water heating systems shall be commissioned in accordance with Section C408.

SECTION C405
ELECTRICAL POWER AND LIGHTING SYSTEMS

C405.1 General. This section covers lighting system controls, the maximum lighting power for interior and exterior applications, electrical energy consumption, vertical and horizontal transportation systems, and minimum efficiencies for motors and transformers. Receptacles shall be controlled according to Section C405.10. *Controlled receptacles* and lighting systems shall be

commissioned according to Section C405.12. Solar readiness shall be provided according to Section C411 and renewable energy shall be provided according to Section C412.

Dwelling units within multi-family buildings shall comply with Sections C405.1.1 and C405.7. All other dwelling units in dormitory, hotel and other residential occupancies that are not classified as multi-family residential occupancies shall comply with Section C405.2.5 and Section C405.1.1 or Section C405.4. *Sleeping units* shall comply with Section C405.2.5 and Section C405.1.1 or Section C405.4.

Lighting installed in *walk-in coolers, walk-in freezers, refrigerated warehouse coolers* and *refrigerated warehouse freezers* shall comply with the lighting requirements of Section C410.2.

Transformers, uninterruptable power supplies, motors and electrical power processing equipment in data center systems shall comply with Section 8 of ASHRAE Standard 90.4 in addition to this code.

C405.1.1 Dwelling and sleeping unit lighting efficacy. No less than 90 percent of the lamps serving *dwelling units* or *sleeping units* shall be provided by light emitting diodes (LED), T-8 or smaller diameter linear fluorescent lamps, or other lamps with a minimum efficacy of 65 lumens per watt.

C405.2 Lighting controls. Lighting systems shall be provided with controls that comply with ((~~one~~)) item 1 or item 2 of the following:

1. Lighting controls as specified in Sections C405.2.1 through C405.2.7. In addition, any contiguous open office area larger than 5,000 square feet shall have its general lighting controlled by either:
   1.1. An enhanced digital lighting control system conforming to the requirements of Section C406.4; or
   1.2. Luminaire-level lighting controls (LLLC) conforming to the requirements in Item 2 of this subsection.
2. *Luminaire level lighting controls (LLLC)* for all areas and lighting controls as specified in Sections C405.2.1, C405.2.3 and C405.2.5. The *LLLC luminaires* shall be independently configured to:
   2.1. Monitor occupant activity to brighten or dim lighting when occupied or unoccupied, respectively.
   2.2. Monitor ambient light, both electric and daylight, and brighten or dim artificial light to maintain desired light level. A maximum of 8 fixtures are permitted to be controlled together to maintain uniform light levels within a single *daylight zone.*
   2.3. For each control strategy, be capable of configuration and re-configuration of performance parameters including: bright and dim set points, timeouts, dimming fade rates, sensor sensitivity adjustments, and wireless zoning configuration.

Exception to Section C405.2: Except for specific application controls required by Section C405.2.5, lighting controls are not required for the following:

1. Areas designated as security or emergency areas that are required to be continuously lighted.
2. Means of egress illumination serving the exit access that does not exceed ((~~0.02~~)) 0.01 watts per square foot of building area is exempt from this requirement.
3. Emergency egress lighting that is normally off.
4. Industrial or manufacturing process areas, as may be required for production and safety.

C405.2.1 Occupant sensor controls. Occupant sensor controls shall be installed to control lights in the following space types:

1. Classrooms/lecture/training rooms.
2. Conference/meeting/multipurpose rooms.
3. Copy/print rooms.
4. Lounge/breakrooms.
5. Enclosed offices.
6. Open plan office areas.
7. Restrooms.
8. Storage rooms.
9. Locker rooms.
10. Other spaces 300 square feet (28 m^2) or less that are enclosed by floor-to- ceiling height partitions.
11. Warehouse storage areas.
12. Enclosed fire rated stairways.
13. Service corridors.
14. Covered parking areas.

Occupant sensor controls in warehouse storage areas, stairways, corridors and library stacks shall comply with Section C405.2.1.2. Occupant sensor controls in open plan office areas shall comply with Section C405.2.1.3. Occupant sensor controls in covered parking areas shall comply with Section C405.2.1.4. Occupant sensors in fire rated stairways shall comply with Section C405.2.1.5. Occupant sensor controls for all other spaces shall comply with Section C405.2.1.1.

Exceptions:

1. Corridors in manufacturing facilities.
2. General lighting and task lighting in shop and laboratory classrooms. **
3. Digital timer switch controls may be provided in lieu of occupant sensor controls in the following space types if under 300 square feet: copy/print rooms, storage rooms and janitorial closets.

   Digital timer switches shall comply with the following:

   3.1. Turn lights on or off with operation of a button, switch or other manual means.

   3.2. Automatically turn lights off within 15 minutes of the lights being turned on. The means for setting the time delay shall not be visible on the front of the switch.

   3.3. The switch shall provide both audible and visual indication of impending time-out of the switch. Audible and visual indication shall be given at least once within five minutes of time-out of the switch. Visual indication shall consist of turning the lights momentarily off, and then back on.

C405.2.1.1 Occupant sensor control function. Occupant sensor controls shall comply with all of the following:

1. They shall be configured to automatically turn off lights within 20 minutes of all occupants leaving the space.
2. They shall be manual on or shall be configured to automatically turn the lighting on to not more than 50 percent power.

   Exception: Full *automatic*-on controls shall be permitted to control lighting in public corridors, stairways, restrooms, primary *building entrance* areas and lobbies, parking garages, and areas where manual-on operation would endanger the safety or security of the room or building occupants.
3. They shall incorporate a manual control to allow occupants to turn lights off.

C405.2.1.2 Occupant sensor control function in warehouses, storage areas and service corridors. Occupant sensor controls shall be configured to comply with all of the following:

1. Automatically reduce lighting power by not less than 50 percent within 20 minutes of all occupants leaving the area.
2. Control lighting in each aisleway and corridor independently, and shall not control lighting beyond the aisleway or corridor being controlled by the sensor.
3. Automatically turn lighting off within 20 minutes of all occupants leaving the space, or comply with Section C405.2.2 to turn lighting off when the building is vacant.
4. Restore lighting to full power when occupants enter the space.

C405.2.1.3 Occupant sensor control function in open plan office areas. Occupant sensor controls in open plan office spaces less than 300 square feet (28 m^2) in area shall comply with Section C405.2.1.1. Occupant sensor controls in all other open plan office spaces shall be configured to comply with all of the following:

1. General lighting is controlled separately in control zones with floor areas not greater than 600 square feet (55 m^2) within the open plan office space.
2. Automatically turn off general lighting in all control zones within 20 minutes after all occupants have left the open plan office space.
3. General lighting power in each control zone is reduced by not less than 80 percent of the full zone general lighting power within 20 minutes of all occupants leaving that control zone. Control functions that switch control zone lights completely off when the zone is unoccupied meet this requirement.
4. *Daylight responsive controls* activate open plan office space general lighting or control zone general lighting only when occupancy for the same area is detected.
5. Lighting controls in open plan office areas larger than 5,000 square feet must also comply with Section C405.2(1).

C405.2.1.4 Occupant sensor control function in parking garages. Occupant sensor controls shall be configured to comply with all of the following:

1. Lighting power of each *luminaire* shall be automatically reduced by a minimum of 30 percent when there is no vehicle or pedestrian activity detected within a lighting zone for 20 minutes. Lighting zones for this requirement shall be no larger than 3600 square feet.

   Exceptions:

   4.1 Lighting in daylight transition zones and ramps without parking.

4.2 Covered parking garages with a total lighting power less than 0.07 watts per square foot.

2. Where time switch controls in accordance with Section C405.2.2 are not installed, the occupant sensor shall automatically turn all the lighting off within 20 minutes of all occupants leaving the space and restore lighting to full power when occupants enter the space.

C405.2.1.5 Occupant sensor control function in enclosed fire rated stairways. Occupant sensor controls shall be configured to automatically reduce lighting power by not less than 50 percent when no occupants have been detected in the stairway for a period not exceeding 20 minutes and restore lighting to full power when occupants enter the stairway. All portions of stairways shall remain illuminated to meet the requirements of Section 1009 of the *International Building Code* when the lighting power is reduced.

C405.2.2 Time switch controls. Each area of the building that is not provided with *occupant sensor controls* or digital timer switch controls complying with Section C405.2.1 shall be provided with time switch controls complying with Section C405.2.2.1.

Exception: Where a manual control provides light reduction in accordance with Section C405.2.3.1, time-switch controls shall not be required for the following:

1. Spaces where patient care is directly provided.
2. Spaces where an *automatic* shutoff would endanger occupant safety or security.
3. Lighting intended for continuous operation.
4. Shop and laboratory classrooms.

C405.2.2.1 Time switch control function. Time switch controls shall comply with the following:

1. Have a minimum 7 day clock.
2. Be capable of being set for 7 different day types per week.
3. Incorporate an *automatic* holiday "shut-off" feature, which turns off all controlled loads for at least 24 hours and then resumes normally scheduled operations.
4. Have program back-up capabilities, which prevent the loss of program and time settings for at least 10 hours, if power is interrupted.
5. Include an override switching device that complies with the following:
   5.1 The override switch shall be a manual control.
   5.2 The override switch, when initiated, shall permit the controlled lighting to remain on for not more than 2 hours.
   5.3 Any individual override switch shall control the lighting for an area not larger than ((~~5,000~~)) 2,500 square feet (((~~465~~)) 232 m^2).
6. Time switch controls are allowed to automatically turn on lighting to full power in corridors, lobbies, restrooms, storage rooms less than 50 square feet, and medical areas of healthcare facilities. In all other spaces, time switch controls are allowed to automatically turn on the lighting to not more than 50 percent power.

Exception: Within mall concourses, auditoriums, sales areas, manufacturing facilities, pools, gymnasiums, skating rinks and sports arenas:

1.1. The time limit shall be permitted to be greater than 2 hours provided the switch is a captive key device.

1.2. The area controlled by the override switch shall not be limited to 5,000 square feet (465 m^2) provided that such area is less than 20,000 square feet (1860 m^2).

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C405.2.3 Manual controls. Stairwells and parking garages are not permitted to use manual switches. All other lighting shall have manual controls complying with the following:

1. They shall be in a location with *ready access* to occupants.
2. They shall be located where the controlled lights are visible, or shall identify the area served by the lights and indicate their status.
3. Each control device shall control an area no larger than a single room or 2,500 square feet, whichever is less, if the room area is less than or equal to 10,000 square feet; or one-quarter of the room or 10,000 square feet, whichever is less, if the room area is greater than 10,000 square feet.

Exceptions:

1. A manual control may be installed in a remote location for the purpose of safety or security provided each remote control device has an indicator pilot light as part of or next to the control device and the light is clearly labeled to identify the controlled lighting.
2. Restrooms.

C405.2.3.1 Light reduction controls. Manual controls shall be configured to provide light reduction control that allows the occupant to reduce the connected lighting load between 30 and 70 percent. Lighting reduction shall be achieved by one of the following *approved* methods:

1. Controlling all lamps or luminaires.
2. Dual switching of alternate rows of luminaires, alternate luminaires or alternate lamps.
3. Switching the middle lamp in three-lamp luminaires independently of the outer lamps.
4. Switching each luminaire or each lamp.

Exceptions:

1. Light reduction controls are not required in *daylight zones* with *daylight responsive controls* complying with Section C405.2.4. **
2. Where provided with manual control, the following areas are not required to have light reduction control:
   2.1. Spaces that have only one luminaire with a rated power of less than 100 watts.
   2.2. Spaces that use less than 0.6 watts per square foot (6.5 W/m^2).
   2.3. Lighting in corridors, lobbies, electrical rooms, restrooms, storage rooms, airport concourse baggage areas, dwelling and sleeping rooms and mechanical rooms.

C405.2.4 Daylight responsive controls. *Daylight responsive controls* complying with Section C405.2.4.1 shall be provided to control the lighting within *daylight zones* in the following spaces:

1. Sidelit zones as defined in Section C405.2.4.2 with more than two general lighting fixtures within the combined primary and secondary sidelit zones.
2. Toplit zones as defined in Section C405.2.4.3 with more than two general lighting fixtures within the daylight zone.

Exception: *Daylight responsive controls* are not required for the following:

1. Spaces in health care facilities where patient care is directly provided.
2. Lighting that is required to have specific application control in accordance with Section C405.2.5.
3. Sidelit zones on the first floor above grade in Group A-2 and Group M occupancies where the *fenestration* adjoins a sidewalk or other outdoor pedestrian area, provided that the light fixtures are controlled separately from the general area lighting.
4. *Daylight zones* where the total proposed lighting power density is less than 35 percent of the lighting power allowance per Section C405.4.2.

C405.2.4.1 Daylight responsive controls function. Where required, daylight responsive controls shall be provided within each space for control of lights in that space and shall comply with all of the following:

1. Lights in primary sidelit zones shall be controlled independently of lights in secondary sidelit zones in accordance with Section C405.2.4.2.

   Exception: Spaces enclosed by walls or ceiling height partitions with no more than three general lighting fixtures may have combined daylight zone control of primary and secondary daylight zones provided *uniform illumination* can be achieved.
2. Lights in toplit zones in accordance with Section C405.2.4.3 shall be controlled independently of lights in sidelit zones in accordance with Section C405.2.4.2.
3. *Daylight responsive controls* within each space shall be configured so that they can be calibrated from within that space by authorized personnel.
4. Calibration mechanisms shall be in a location with *ready access.*
5. *Daylight responsive controls* shall be configured to completely shut off all controlled lights in that zone.
6. Lights in sidelit zones in accordance with Section C405.2.4.2 facing different cardinal orientations (i.e., within 45 degrees of due north, east, south, west) shall be controlled independently of each other.

   Exception: Up to two light fixtures in each space are permitted to be controlled together with lighting in a daylight zone facing a different cardinal orientation.
7. Incorporate time-delay circuits to prevent cycling of light level changes of less than three minutes.
8. The maximum area a single daylight responsive control device serves shall not exceed 2,500 square feet (232 m^2) and no more than 60 lineal feet (18.3 m) of facade.
9. Occupant override capability of daylight dimming controls is not permitted, other than a reduction of light output from the level established by the daylighting controls.

10. Daylight responsive controls shall be set initially to activate at 30 footcandles (323 lux) or not more than 110 percent of the illuminance level specified on the construction documents.

C405.2.4.1.1 Dimming. *Daylight responsive controls* shall be configured to automatically reduce the power of *general lighting* in the *daylight zone* in response to available daylight, while maintaining *uniform illumination* in the space through one of the following methods:

1. Continuous dimming using dimming ballasts/dimming drivers and daylight-sensing *automatic* controls. The system shall reduce lighting power continuously to less than 15 percent of rated power at maximum light output.
2. Stepped dimming using multi-level switching and daylight-sensing controls. The system shall provide a minimum of two steps of uniform illumination between 0 and 100 percent of rated power at maximum light output. Each step shall be in equal increments of power, plus or minus 10 percent.

General lighting within daylight zones in offices, classrooms, laboratories and library reading rooms shall use the continuous dimming method. Stepped dimming is not allowed as a method of daylight zone control in these spaces.

C405.2.4.2 Sidelit zone. The sidelit zone is the floor area adjacent to *vertical fenestration* which complies with the following:

1. Where the *fenestration* is located in a wall, the sidelit zone includes the primary and secondary daylight zones. The primary daylight zone shall extend laterally to the nearest full height wall, or up to 1.0 times the height from the floor to the top of the fenestration, and longitudinally from the edge of the fenestration to the nearest full height wall, or up to 2 feet (610 mm), whichever is less, as indicated in Figure C405.2.4.2(1). The secondary daylight zone begins at the edge of the primary daylight zone and extends laterally to the nearest full height wall, or up to 2.0 times the height from the floor to the top of the fenestration, whichever is less, as indicated in Figure C405.2.4.2(1).
2. Where *clerestory fenestration* is located in a wall, the sidelit zone includes a lateral area twice the depth of the clerestory fenestration height, projected upon the floor at a 45 degree angle from the center of the clerestory fenestration. The longitudinal width of the sidelit zone is calculated the same as for fenestration located in a wall. Where the 45 degree angle is interrupted by an obstruction greater than 0.7 times the ceiling height, the daylight zone shall remain the same lateral area but be located between the clerestory and the obstruction, as indicated in Figure C405.2.4.2(2).
3. If the rough opening area of a vertical fenestration assembly is less than 10 percent of the calculated primary sidelit zone area for this fenestration, it does not qualify as a sidelit zone.
4. The visible transmittance of the fenestration is no less than 0.20.
5. In parking garages with floor area adjacent to perimeter wall openings, the sidelit zone shall include the area within 20 feet of any portion of a perimeter wall that has a net opening to wall ratio of at least 40 percent.

C405.2.4.3 Toplit zone. The toplit zone is the floor area underneath a roof fenestration assembly which complies with the following:

1. The toplit zone shall extend laterally and longitudinally beyond the edge of the roof fenestration assembly to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 0.7 times the ceiling height, whichever is less, as indicated in Figure C405.2.4.3(1).
2. Where the fenestration is located in a rooftop monitor, the toplit zone shall extend laterally to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 1.0 times the height from the floor to the bottom of the fenestration, whichever is less, and longitudinally from the edge of the fenestration to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 0.25 times the height from the floor to the bottom of the *fenestration*, whichever is less, as indicated in Figures C405.2.4.3(2) and C405.2.4.3(3).
3. Where toplit zones overlap with sidelit zones, lights within the overlapping area shall be assigned to the toplit zone.
4. The product of the *visible transmittance* of the roof fenestration assembly and the area of the rough opening of the roof fenestration assembly, divided by the area of the toplit zone is no less than 0.008.
5. Where located under atrium fenestration, the toplit zone shall include the bottom floor area directly beneath the atrium fenestration, and the top floor directly under the atrium fenestration, as indicated in Figure C405.2.4.3(4). The toplit zone area at the top floor is calculated the same as for a toplit zone. Intermediate levels below the top floor that are not directly beneath the atrium are not included.

C405.2.5 Additional lighting controls. Specific application lighting shall be provided with controls, in addition to controls required by other sections, for the following:

1. The following lighting shall be controlled by an occupant sensor complying with Section C405.2.1.1 or a time-switch control complying with Section C405.2.2.1 In addition, a manual control shall be provided to control such lighting separately from the general lighting in the space:
   1.1. Display and accent.
   1.2. Lighting in display cases.
   1.3. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting.
   1.4. Lighting equipment that is for sale or demonstration in lighting education.
2. *Sleeping units* shall have control devices or systems configured to automatically switch off all permanently installed luminaires and switched receptacles, including those installed within furniture, within 20 minutes after all occupants have left the unit.

   Exceptions:
   1. Lighting and switched receptacles controlled by card key controls.
   2. Spaces where patient care is directly provided.
3. Permanently installed luminaires within dwelling units shall be provided with controls complying with either Section C405.2.1.1 or C405.2.3.1.
4. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control that is independent of the controls for other lighting within the room or space. ((~~Each control zone shall be no greater than the area served by a single luminaire or 4,000 square feet, whichever is larger.~~))
5. Luminaires serving the exit access and providing means of egress illumination required by Section 1006.1 of the *International Building Code*, including luminaires that function as both normal and emergency means of egress illumination shall be controlled by a combination of listed emergency relay and occupancy sensors, or signal from another building control system, that automatically shuts off the lighting when the areas served by that illumination are unoccupied.

   Exception: Means of egress illumination serving the exit access that does not exceed ((~~0.02~~)) 0.01 watts per square foot of building area is exempt from this requirement.

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C405.2.6 Exterior lighting controls. Exterior lighting systems shall be provided with controls that comply with Sections C405.2.6.1 through C405.2.6.4. Decorative lighting systems shall comply with Sections C405.2.6.1, C405.2.6.2 and C405.2.6.4.

Exceptions:

1. Lighting for covered vehicle entrances or exits from buildings or parking structures where required for safety, security or eye adaption.
2. Lighting controlled from within dwelling units.

C405.2.6.1 Daylight shutoff. Lights shall be configured to automatically turn off when daylight is present and satisfies the lighting needs.

C405.2.6.2 Facade and landscape lighting shutoff. Building facade and landscape lighting shall be configured to automatically shut off ((~~for a minimum of 6 hours per night or from not later than one hour after business closing to not earlier than one hour before business opening, whichever is less~~)) between midnight or business/facility closing, whichever is later, and 6 a.m. or business/facility opening, whichever is earlier.

Exception: Areas where an *automatic* shutoff would endanger safety or security.

C405.2.6.3 Lighting setback. Lighting that is not controlled in accordance with Section C405.2.6.2 shall be controlled so that the total wattage of such lighting is automatically reduced by not less than 30 percent by selectively switching off or dimming luminaires at one of the following times:

1. From not later than 12 midnight to 6 a.m.
2. From not later than one hour after business closing to not earlier than one hour before business opening.
3. During any period when no activity has been detected for 15 minutes or more.

C405.2.6.4 Exterior time-switch control functions. Time switch controls for exterior lighting shall comply with the following:

1. They shall have a clock capable of being programmed for not fewer than 7 days.
2. They shall be capable of being set for seven different day types per week.
3. They shall incorporate an *automatic* holiday setback feature.

4. They shall have program backup capabilities that prevent the loss of program and time settings for a period of at least 10 hours in the event that power is interrupted.

C405.2.7 Area controls. The maximum lighting power that may be controlled from a single switch or *automatic* control device shall not exceed that which is provided by a 20 ampere circuit loaded to not more than 80 percent. A master control may be installed provided the individual switches retain their capability to function independently. Circuit breakers may not be used as the sole means of switching.

Exception: Areas less than 5 percent of the building footprint for footprints over 100,000 ft^2.

C405.3 Reserved

C405.4 Interior lighting power requirements. A building complies with this section if its total connected interior lighting power calculated under Section C405.4.1 is no greater than the interior lighting power allowance calculated under Section C405.4.2.

C405.4.1 Total connected interior lighting power. The total connected interior lighting power shall be determined in accordance with Equation 4-10.

As an option, in areas of the building where all interior lighting equipment is fed from dedicated lighting branch circuits, the total connected interior lighting power is permitted to be calculated as the sum of the capacities of the lighting branch circuits serving those areas. For the purposes of this section, the connected interior lighting power of a 20-ampere circuit is considered to be 16 amperes, and that of a 15-ampere circuit is 12 amperes. Use of this alternative and the boundaries of the applicable areas shall be clearly documented on the electrical construction documents.

$$TCLP = [LVL + BLL + TRK + POE + \text{Other}] \qquad \textbf{(Equation 4-10)}$$

Where:

TCLP = Total connected lighting power (watts)

LVL = For luminaires with lamps connected directly to building power, such as line voltage lamps, the rated wattage of the lamp, which must be minimum 60 lumen/watt.

BLL = For luminaires incorporating a ballast or transformer, the rated input wattage of the ballast or transformer when operating the lamp.

TRK = For lighting track, cable conductor, rail conductor and plug-in busway systems that allow the addition and relocation of luminaires without rewiring, the wattage shall be one of the following:

1. The specified wattage of the luminaires, but not less than 16 W/lin. ft. (52 W/lin. m).
2. The wattage limit of the permanent current-limiting devices protecting the system.
3. The wattage limit of the transformer supplying the system.

POE = For other modular lighting systems served with power supplied by a driver, power supply or transformer, including but not limited to low-voltage lighting systems, the wattage of the system shall be the maximum rated input wattage of the driver, power supply or transformer published in the manufacturer's catalogs, as specified by UL 2108 or 8750. For power-over-Ethernet lighting systems, power provided to installed non-lighting devices may be subtracted from the total power rating of the power-over-Ethernet system.

Other = The wattage of all other luminaires and lighting, sources not covered above and associated with interior lighting verified by data supplied by the manufacturer or other *approved* sources.

The connected power associated with the following lighting equipment and applications is not included in calculating total connected lighting power.

1. Television broadcast lighting for playing areas in sports arenas
2. Emergency lighting automatically off during normal building operation.
3. Lighting in spaces specifically designed for use by occupants with special lighting needs including those with visual impairment and other medical and age-related issues.
4. Casino gaming areas.
5. General area lighting power in industrial and manufacturing occupancies dedicated to the inspection or quality control of goods and products.
6. Mirror lighting in dressing rooms.
7. Task lighting for medical and dental purposes that is in addition to general lighting and controlled by an independent control device.
8. Display lighting for exhibits in galleries, museums and monuments that is in addition to general lighting and controlled by an independent control device.
9. Lighting for theatrical purposes, including performance, stage, film production and video production.

10. Lighting for photographic processes.
11. Lighting integral to equipment or instrumentation and installed by the manufacturer.
12. ((~~Task lighting~~)) Lighting for plant growth or maintenance where the lamp ((~~efficacy is not less than 90 lumens per watt~~)) has a tested photosynthetic photon efficacy (PPE) per watt of not less than 1.70 micromoles per joule for *greenhouses* and 1.90 micromoles per joule for indoor plant growth spaces.
13. Advertising signage or directional signage.
14. Lighting for food warming.
15. Lighting equipment that is for sale.
16. Lighting demonstration equipment in lighting education facilities.
17. Lighting *approved* because of safety considerations.
18. Lighting in retail display windows, provided the display area is enclosed by ceiling-height partitions.
19. Furniture mounted supplemental task lighting that is controlled by *automatic* shutoff.
20. Exit signs.
21. Lighting used for aircraft painting.
22. Germicidal lighting that is in addition to and controlled independently from the general lighting.

C405.4.2 Interior lighting power allowance. The total interior lighting power allowance (watts) is determined according to Table C405.4.2(1) using the Building Area Method, or Table C405.4.2(2) using the Space-by-Space Method, for all areas of the building covered in this permit.

C405.4.2.1 Building area method. For the Building Area Method, the interior lighting power allowance is the floor area for each building area type listed in Table C405.4.2(1) times the value from Table C405.4.2(1) for that area. For the purposes of this method, an "area" shall be defined as all contiguous spaces that accommodate or are associated with a single building area type as listed in Table C405.4.2(1). Where this method is used to calculate the total interior lighting power for an entire building, each building area type shall be treated as a separate area.

C405.4.2.2 Space-by-space method. For the Space-by-Space Method, the interior lighting power allowance is determined by multiplying the floor area of each space times the value for the space type in Table C405.4.2(2) that most closely represents the proposed use of the space, and then summing the lighting power allowances for all spaces. Tradeoffs among spaces other than covered parking areas are permitted.

Each area enclosed by partitions that are 80 percent of the ceiling height or taller shall be considered a separate space and assigned the appropriate space type from Table C405.4.2(2). If a space has multiple functions where more than one space type is applicable, that space shall be broken up into smaller subspaces, each using their own space type. Any of these subspaces that are smaller in floor area than 20 percent of the enclosed space and less than 1,000 square feet need not be broken out separately.

TABLE C405.4.2(1)
INTERIOR LIGHTING POWER ALLOWANCES: BUILDING AREA METHOD

Building Area Type	((~~LPD (w/ft^2)~~))	LPD (w/ft^2)
Automotive facility	((~~0.64~~))	0.58
Convention center	((~~0.64~~))	0.58
Court house	((~~0.79~~))	0.71
Dining: Bar lounge/leisure	((~~0.79~~))	0.71
Dining: Cafeteria/fast food	((~~0.72~~))	0.65
Dining: Family	((~~0.71~~))	0.64
Dormitory[a,b]	((~~0.46~~))	0.41
Exercise center	((~~0.67~~))	0.60
Fire station[a]	((~~0.54~~))	0.49
Gymnasium	((~~0.75~~))	0.68
Health care clinic	((~~0.70~~))	0.63
Hospital[a]	((~~0.84~~))	0.84
Hotel[a,b]	((~~0.56~~))	0.50
Library	((~~0.83~~))	0.75
Manufacturing facility	((~~0.82~~))	0.74
Motion picture theater	((~~0.44~~))	0.40
Multifamily[c]	((~~0.41~~))	0.37
Museum	((~~0.55~~))	0.50
Office	((~~0.64~~))	0.58
Parking garage	((~~0.14~~))	0.13
Penitentiary	((~~0.65~~))	0.65
Performing arts theater	((~~0.84~~))	0.76
Police station	((~~0.66~~))	0.60
Post office	((~~0.65~~))	0.59
Religious building	((~~0.67~~))	0.60
Retail	((~~0.84~~))	0.76
School/university	((~~0.70~~))	0.63
Sports arena	((~~0.62~~))	0.54
Town hall	((~~0.69~~))	0.62
Transportation	((~~0.50~~))	0.45
Warehouse	((~~0.40~~))	0.36
Workshop	((~~0.91~~))	0.82

a. Where sleeping units are excluded from lighting power calculations by application of Section R404.1, neither the area of the sleeping units nor the wattage of lighting in the sleeping units is counted.
b. Where dwelling units are excluded from lighting power calculations by application of Section R404.1, neither the area of the dwelling units nor the wattage of lighting in the dwelling units is counted.
c. Dwelling units are excluded. Neither the area of the dwelling units nor the wattage of lighting in the dwelling units is counted.

TABLE C405.4.2(2)
INTERIOR LIGHTING POWER ALLOWANCES: SPACE-BY-SPACE METHOD

COMMON SPACE-BY-SPACE TYPES[a]	((~~LPD (w/ft²)~~)	LPD (w/ft²)
Atrium – Less than 20 feet in height	((~~0.39~~))	0.35
Atrium – 20 to 40 feet in height	((~~0.48~~))	0.43
Atrium – Above 40 feet in height	((~~0.60~~))	0.54
Audience/seating area – Permanent		
In an auditorium	((~~0.61~~))	0.55
In a gymnasium	((~~0.23~~))	0.21
In an motion picture theater	((~~0.27~~))	0.24
In a penitentiary	((~~0.67~~))	0.67
In an performing arts theater	((~~1.16~~))	1.04
In a religious building	((~~0.72~~))	0.65
In a sports arena	((~~0.33~~))	0.30
Otherwise	((~~0.23~~))	0.21
Banking activity area	((~~0.61~~))	0.55
Breakroom (see Lounge/breakroom)		
Classroom/lecture hall/training room		
In a penitentiary	((~~0.89~~))	0.89
Otherwise[m]	((~~0.71~~))	0.64
Computer room, data center	((~~0.94~~))	0.85
Conference/meeting/multipurpose	((~~0.97~~))	0.87
Confinement cell	((~~0.70~~))	0.63
Copy/print room	((~~0.31~~))	0.28
Corridor		
In a facility for the visually impaired (and not used primarily by the staff)[b]	((~~0.71~~))	0.71
In a hospital	((~~0.71~~))	0.71
In a manufacturing facility	((~~0.41~~))	0.37
Otherwise[c,q]	((~~0.41~~))	0.37
Courtroom[c]	((~~1.20~~))	1.08
Dining area		
In a penitentiary	((~~0.42~~))	0.42
In a facility for the visually impaired (and not used primarily by the staff)[b]	((~~1.27~~))	1.27
In a bar/lounge or leisure dining[n]	((~~0.86~~))	0.77
In cafeteria or fast food dining	((~~0.40~~))	0.36
In a family dining area[n]	((~~0.60~~))	0.54
Otherwise	((~~0.43~~))	0.39
Electrical/mechanical	((~~0.43~~))	0.39
Emergency vehicle garage	((~~0.52~~))	0.47
Food preparation	((~~1.09~~))	0.98
Guest room[a,b]	((~~0.41~~))	0.37
Laboratory		
In or as a classrooms	((~~1.11~~))	1.00
Otherwise	((~~1.33~~))	1.20
Laundry/washing area	((~~0.53~~))	0.48
Loading dock, interior	((~~0.88~~))	0.79

TABLE C405.4.2(2)
INTERIOR LIGHTING POWER ALLOWANCES: SPACE-BY-SPACE METHOD

COMMON SPACE-BY-SPACE TYPES[a]	((~~LPD (w/ft²)~~)	LPD (w/ft²)
Lobby[c]		
In a facility for the visually impaired (and not used primarily by the staff)[b]	((~~1.69~~))	1.69
For an elevator	((~~0.65~~))	0.59
In a hotel	((~~0.51~~))	0.46
In a motion picture theater	((~~0.23~~))	0.21
In a performing arts theater	((~~1.25~~))	1.13
Otherwise	((~~0.84~~))	0.76
Locker room	((~~0.52~~))	0.47
Lounge/breakroom[n]		
In a health care facility	((~~0.42~~))	0.42
Otherwise	((~~0.59~~))	0.53
Office		
Enclosed ≤ 250	((~~0.74~~))	0.67
Enclosed > 250	((~~0.66~~))	0.59
Open plan	((~~0.61~~))	0.55
Parking area, interior	((~~0.15~~))	0.14
Pharmacy area	((~~1.66~~))	1.66
Restroom		
In a facility for the visually impaired (and not used primarily by the staff)[b]	((~~1.26~~))	1.26
Otherwise[n]	((~~0.63~~))	0.57
Sales area	((~~1.05~~))	0.95
Seating area, general	((~~0.23~~))	0.21
((~~Stairway (See space containing stairway)~~))		
Stairwell[n]	((~~0.49~~))	0.44
Storage room		
< 50 ft²	((~~0.51~~))	0.46
50-100 ft²	((~~0.38~~))	0.34
All other storage	((~~0.38~~))	0.34
Vehicular maintenance	((~~0.60~~))	0.54
Workshop	((~~1.26~~))	1.13

TABLE C405.4.2(2) (continued)
INTERIOR LIGHTING POWER ALLOWANCES: SPACE-BY-SPACE METHOD

BUILDING SPECIFIC SPACE-BY-SPACE TYPES[a]	((~~LPD (w/ft²)~~))	LPD (w/ft²)
Automotive (see Vehicular maintenance)	((~~0.60~~))	
Convention center – Exhibit space	((~~0.61~~))	0.55
Dormitory living quarters[a,b]	((~~0.50~~))	0.45
Facility for the visually impaired[b]		
In a chapel (and not used primarily by the staff)	((~~0.70~~))	0.70
In a recreation room (and not used primarily by the staff)	((~~1.77~~))	1.77
Fire stations[g]		
Sleeping quarters	((~~0.23~~))	0.21
Gymnasium/fitness center		
In an exercise area	((~~0.90~~))	0.83
In a playing area	((~~0.85~~))	0.77

TABLE C405.4.2(2) (continued)
INTERIOR LIGHTING POWER ALLOWANCES: SPACE-BY-SPACE METHOD

BUILDING SPECIFIC SPACE-BY-SPACE TYPES[a]	((~~LPD (w/ft²)~~))	LPD (w/ft²)
Health care facility		
In an exam/treatment room	((~~1.40~~))	1.40
In an imaging room	((~~0.94~~))	0.94
In a medical supply room	((~~0.62~~))	0.62
In a nursery	((~~0.92~~))	0.92
In a nurse's station	((~~1.17~~))	1.17
In an operating room	((~~2.26~~))	2.26
In a patient room[g]	((~~0.68~~))	0.68
In a physical therapy room	((~~0.91~~))	0.91
In a recovery room	((~~1.25~~))	1.25
Library[f]		
In a reading area[n]	((~~0.31~~))	0.86
In the stacks	((~~1.10~~))	0.99
Manufacturing facility		
In a detailed manufacturing area	((~~0.80~~))	0.72
In an equipment room	((~~0.76~~))	0.68
In an extra high bay area (> 50-foot floor-ceiling height)	((~~1.42~~))	1.28
In a high bay area (25 – 50-foot floor-ceiling height)	((~~1.24~~))	1.12
In a low bay area (< 25-foot floor-ceiling height)	((~~0.86~~))	0.77
Museum		
In a general exhibition area	((~~0.31~~))	0.28
In a restoration room	((~~1.10~~))	0.99
Performing arts theater dressing/fitting room	((~~0.41~~))	0.37
Post office—Sorting area	((~~0.71~~))	0.69
Religious building		
In a fellowship hall[n]	((~~0.54~~))	0.49
In a worship pulpit/choir area[n]	((~~0.85~~))	0.77
Retail		
In a dressing/fitting room	((~~0.51~~))	0.46
In a mall concourse	((~~0.82~~))	0.74
Sports arena—Playing area		
For a Class 1 facility[i]	((~~2.94~~))	2.94
For a Class 2 facility[j]	((~~2.01~~))	2.01
For a Class 3 facility[k]	((~~1.30~~))	1.30
For a Class 4 facility[l]	((~~0.86~~))	0.86
Transportation		
In a baggage/carousel area	((~~0.39~~))	0.35
In an airport concourse	((~~0.25~~))	0.23
At a terminal ticket counter[n]	((~~0.51~~))	0.46
Warehouse—Storage area		
For medium to bulky palletized items	((~~0.33~~))	0.30
For smaller, hand-carried items	((~~0.69~~))	0.62

Keys to Table C405.4.2(2)

For SI: 1 foot = 304.8 mm, 1 watt per square foot = 11 W/m^2.

Footnotes to Table C405.4.2(2)

a. In cases where both a common space type and a building area specific space type are listed, the building area specific space type shall apply.

b. A facility for the visually impaired is a facility that is licensed or will be licensed by local or state authorities for senior long-term care, adult daycare, senior support or people with special visual needs.

c. For spaces in which lighting is specified to be installed in addition to, and controlled separately from, the general lighting for the purposed of highlighting art or exhibits, provided that the additional lighting power shall not exceed 0.5 W/ft^2 of such spaces.
d. RESERVED.
e. RESERVED.
f. RESERVED.
g. Where sleeping units are excluded from lighting power calculations by application of Section R404.1, neither the area of the sleeping units nor the wattage of lighting in the sleeping units is counted.
h. Where dwelling units are excluded from lighting power calculations by application of Section R404.1, neither the area of the dwelling units nor the wattage of lighting in the dwelling units is counted.
i. Class I facilities consist of professional facilities; and semi-professional, collegiate or club facilities with seating for 5,000 or more spectators.
j. Class II facilities consist of collegiate and semi-professional facilities with seating for fewer than 5,000 spectators; club facilities with seating between 2,000 and 5,000 spectators; and amateur league and high school facilities with seating for more than 2,000 spectators.
k. Class III facilities consist of club, amateur league and high school facilities with seating for 2,000 or fewer spectators.
l. Class IV facilities consist of elementary school and recreational facilities; and amateur league and high school facilities without provisions for spectators.
m. For classrooms, additional lighting power allowance of 4.50 W/lineal foot of white or chalk boards for directional lighting dedicated to white or chalk boards.
n. Additional lighting power allowance of 0.30 W/square foot for ornamental lighting. Qualifying ornamental lighting includes luminaires such as chandeliers, sconces, lanterns, neon and cold cathode, light emitting diodes, theatrical projectors, moving lights and light color panels when any of those lights are used in a decorative manner that does not serve as display lighting or general lighting.
o. For scientific laboratories, additional lighting power allowance of 0.35 Watts per square foot for specialized task work – lighting that provides for small-scale, cognitive or fast performance visual tasks; lighting required for operating specialized equipment associated with pharmaceutical/laboratorial activities.
p. For offices, additional lighting power allowance of 0.20 W/square foot for portable lighting, which includes under shelf or furniture-mounted supplemental task lighting qualifies when controlled by a time clock or an occupancy sensor.
q. For corridors, additional lighting power allowance of 0.25 W/square foot for display lighting and decorative lighting where provided for aesthetic purposes. Decorative lighting fixtures in corridors are also permitted to provide general lighting. This additional allowance is not permitted to be used together with the allowance in footnote c for highlighting art or exhibits.

C405.4.2.2.1 Additional interior lighting power. Where using the Space-by-Space Method, an increase in the interior lighting power allowance is permitted for specific lighting functions. Additional power shall be permitted only where the specified lighting is installed and automatically controlled separately from the general lighting, to be turned off during nonbusiness hours. This additional power shall be used only for the specified luminaires and shall not be used for any other purpose. An increase in the interior lighting power allowance is permitted for lighting equipment to be installed in sales areas specifically to highlight merchandise. The additional lighting power shall be determined in accordance with Equation 4-11:

$$\text{Additional interior lighting power allowance} = 500 \text{ watts} + (\text{Retail Area 1} \times 0.45 \text{ W/ft}^2) + (\text{Retail Area 2} \times 0.45 \text{ W/ft}^2) + (\text{Retail Area 3} \times 1.05 \text{ W/ft}^2) + (\text{Retail Area 4} \times 1.87 \text{ W/ft}^2) \quad \textbf{(Equation 4-11)}$$

Where:

Retail Area 1 = The floor area for all products not listed in Retail Area 2, 3 or 4.

Retail Area 2 = The floor area used for the sale of vehicles, sporting goods and small electronics.

Retail Area 3 = The floor area used for the sale of furniture, clothing, cosmetics and artwork.

Retail Area 4 = The floor area used for the sale of jewelry, crystal and china.

Exception: Other merchandise categories are permitted to be included in Retail Areas 2 through 4, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display requirement is approved by the code official.

C405.5 Exterior lighting power requirements. The total connected exterior lighting power calculated in accordance with Section C405.5.2 shall not be greater than the exterior lighting power allowance calculated in accordance with Section C405.5.3.

C405.5.1 Exterior building grounds lighting. All exterior building grounds luminaires that operate at greater than 50 watts shall have a minimum efficacy of 100 lumens per watt unless the luminaire is controlled by a motion sensor or qualifies for one of the exceptions under Section C405.5.2.

Exceptions:

1. Solar-powered lamps not connected to any electrical service.
2. Luminaires controlled by a motion sensor.
3. Luminaires that qualify for one of the exceptions under Section C405.5.2.

C405.5.2 Total connected exterior building lighting power. The total exterior connected lighting power shall be the total maximum rated wattage of all exterior lighting that is powered through the energy service for the building.

Exception: Lighting used for the following applications shall not be included:

1. Lighting *approved* because of safety considerations.

2. Emergency lighting automatically off during normal business operation.
3. Exit signs.
4. Specialized signal, directional and marker lighting associated with transportation.
5. Advertising signage or directional signage.
6. Integral to equipment or instrumentation and is installed by its manufacturer.
7. Theatrical purposes, including performance, stage, film production and video production.
8. Athletic playing areas.
9. Temporary lighting.
10. Industrial production, material handling, transportation sites and associated storage areas.
11. Theme elements in theme/amusement parks.
12. Lighting integrated within or used to highlight features of art, public monuments and the national flag.
13. Lighting for water features and swimming pools.
14. Lighting that is controlled from within *dwelling units*, where the lighting complies with Section R404.1.

C405.5.3 Exterior lighting power allowance. The total exterior lighting power allowance is the sum of the base site allowance plus the individual allowances for areas that are to be illuminated by lighting that is powered through the energy service for the building. Covered parking garage lighting is not considered exterior lighting for the purposes of this calculation. Lighting power allowances are as specified in Table C405.5.3(2). The lighting zone for the building exterior is determined in accordance with Table C405.5.3(1) unless otherwise specified by the *code official*.

TABLE C405.5.3(1)
EXTERIOR LIGHTING ZONES

LIGHTING ZONE	DESCRIPTION
1	Developed areas of national parks, state parks, forest land, and rural areas
2	Areas predominantly consisting of residential zoning, neighborhood business districts, light industrial with limited night-time use and residential mixed use areas
3	All other areas not classified as lighting zone 1, 2 or 4
((4)) Not used	((~~High-activity commercial districts in major metropolitan areas as designated by the local land use planning authority~~))

TABLE C405.5.3(2)
LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS

	LIGHTING ZONES			
	Zone 1	Zone 2	Zone 3	Zone 4
Base Site Allowance	350 W	400 W	500 W	900 W
Uncovered Parking Areas				
Parking areas and drives	0.03 W/ft^2	0.04 W/ft^2	0.06 W/ft^2	0.08 W/ft^2
Building Grounds				
Walkways and ramps less than 10 feet wide	0.5 W/linear foot	0.5 W/linear foot	0.6 W/linear foot	0.7 W/linear foot
Walkways and ramps 10 feet wide or greater, plaza areas special feature areas	0.10 W/ft^2	0.10 W/ft^2	0.11 W/ft^2	0.14 W/ft^2
Dining areas	0.65 W/ft^2	0.65 W/ft^2	0.75 W/ft^2	0.95 W/ft^2
Stairways	0.6 W/ft^2	0.7 W/ft^2	0.7 W/ft^2	0.7 W/ft^2
Pedestrian tunnels	0.12 W/ft^2	0.12 W/ft^2	0.14 W/ft^2	0.21 W/ft^2
Landscaping	0.03 W/ft^2	0.04 W/ft^2	0.04 W/ft^2	0.04 W/ft^2
Building Entrances and Exits				
Pedestrian and vehicular entrances and exists	14 W/linear foot of opening	14 W/linear foot of opening	21 W/linear foot of opening	21 W/linear foot of opening
Entry canopies	0.2 W/ft^2	0.25 W/ft^2	0.4 W/ft^2	0.4 W/ft^2
Loading docks	0.35 W/ft^2	0.35 W/ft^2	0.35 W/ft^2	0.35 W/ft^2
Sales Canopies				
Free-standing and attached	0.4 W/ft^2	0.4 W/ft^2	0.6 W/ft^2	0.7 W/ft^2
Outdoor Sales				
Open areas (including vehicle sales lots)	0.2 W/ ft^2	0.2 W/ ft^2	0.35 W/ ft^2	0.5 W/ ft^2
Street frontage for vehicle sales lots in addition to "open area" allowance	No allowance	7 W/linear foot	7 W/linear foot	21 W/linear foot

For SI: 1 foot = 304.8 mm, 1 watt per square foot = W/0.0929 m^2.

TABLE C405.5.3(3)
INDIVIDUAL LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS

	LIGHTING ZONES			
	Zone 1	Zone 2	Zone 3	Zone 4
Building facades	No Allowance	0.075 W/ft^2 of gross above-grade wall area	0.113 W/ft^2 of gross above-grade wall area	0.150 W/ft^2 of gross above-grade wall area
Automated teller machines (ATM) and night depositories	135 W per location plus 45 W per additional ATM per location			
Uncovered entrances and gatehouse inspection stations at guarded facilities	0.5 W/ft^2			
Uncovered loading areas for law enforcement, fire, ambulance and other emergency service vehicles	0.35 W/ft^2			
Drive-up windows/doors	200 W per drive-through			
Parking near 24-hour retail entrances	400 W per main entry			

C405.5.3.1 Additional exterior lighting power. Any increase in the exterior lighting power allowance is limited to the specific lighting applications indicated in Table C405.5.3(3). The additional power shall be used only for the luminaires that are serving these applications and shall not be used for any other purpose.

C405.5.4 Gas lighting. Gas-fired lighting appliances shall not be equipped with continuously burning pilot ignition systems.

C405.5.5 Full cutoff luminaires. For open parking and outdoor areas and roadways, luminaires mounted more than 15 feet above the ground shall have a luminaire light distribution in which zero candela intensity occurs at an angle of 90 degrees above nadir, and all greater angles from nadir.

C405.6 Electrical transformers. Low-voltage dry-type distribution electric transformers shall meet the minimum efficiency requirements of Table C405.6 as tested and rated in accordance with the test procedure listed in DOE 10 CFR 431. The efficiency shall be verified through certification under an approved certification program or, where no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the transformer manufacturer.

Exception: The following transformers are exempt:

1. Transformers that meet the Energy Policy Act of 2005 exclusions based on the DOE 10 CFR 431 definition of special purpose applications.
2. Transformers that meet the Energy Policy Act of 2005 exclusions that are not to be used in general purpose applications based on information provided in DOE 10 CFR 431.
3. Transformers that meet the Energy Policy Act of 2005 exclusions with multiple voltage taps where the highest tap is not less than 20 percent more than the lowest tap.
4. Drive transformers.
5. Rectifier transformers.
6. Auto-transformers.
7. Uninterruptible power system transformers.
8. Impedance transformers.
9. Regulating transformers.
10. Sealed and nonventilating transformers.
11. Machine tool transformer.
12. Welding transformer.
13. Grounding transformer.
14. Testing transformer.

TABLE C405.6
MINIMUM NOMINAL EFFICIENCY LEVELS FOR 10 CFR 431
LOW VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMERS

Single Phase Transformers		Three Phase Transformers	
kVA[a]	Efficiency (%)[b]	kVA[a]	Efficiency (%)[b]
15	97.70	15	97.89
25	98.00	30	98.23
37.5	98.20	45	98.40
50	98.30	75	98.60
75	98.50	112.5	98.74
100	98.60	150	98.83
167	98.70	225	98.94
250	98.80	300	99.02
333	98.90	500	99.14
		750	99.23
		1000	99.28

a. kiloVolt-Amp rating.
b. Nominal efficiencies shall be established in accordance with the DOE 10 CFR 431 test procedure for low voltage dry-type transformers.

C405.7 Dwelling unit electrical energy consumption. Each dwelling unit located in a Group R-2 building shall have a separate electrical meter. A utility tenant meter meets this requirement. See Section C409 for additional requirements for energy metering and energy consumption management.

Exception: Dwelling units in other than Group R-2 apartment and live/work units are not required to provide a separate electrical metering at each dwelling unit where electrical usage is metered separately for each of the following building end uses:

1. Dwelling units.
2. Sleeping units.
3. Commercial kitchens.
4. Central laundries.

C405.7.1 Electric receptacles at dwelling unit gas appliances. Where *dwelling unit* appliances are served by natural gas, an electrical receptacle and circuit shall be provided at each gas appliance with sufficient capacity to serve a future electric appliance in the same location. The receptacles and circuits shall be included in the electrical service load calculation and shall meet the requirements of items 1 through 3 below. The receptacle for each gas appliance shall be located within 12 inches of the appliance and without obstructions between the appliance and the outlet. An electric receptacle is not required for a decorative gas fireplace.

1. Each gas range, cooktop, or oven, or combination appliance, location shall be served by a dedicated 240/208-volt, 40-amp receptacle connected to the *dwelling unit* electric panel with a 3-conductor branch circuit complying with 210.19(A)(3) of the Seattle electrical code and a minimum included load of 9600 VA for 240-volt systems or 8000 VA for 208-volt systems.
2. Each gas clothes dryer location shall be served by a dedicated 240/208-volt, 30-amp receptacle connected to the *dwelling unit* electric panel with a 3-conductor branch circuit and a minimum included load of 5000 VA.
3. Each gas domestic water heater location shall be served by a dedicated 240/208 volt, 30-amp outlet connected to the *dwelling unit* electrical panel with a 3-conductor branch circuit and a minimum included load of 4500 VA.

C405.8 Electric motor efficiency. All electric motors, fractional or otherwise, shall meet the minimum efficiency requirements of Tables C405.8(1) through C405.8(4) when tested and rated in accordance with DOE 10 CFR. The efficiency shall be verified through certification under an approved certification program, or, where no certification program exists, the equipment efficiency rating shall be supported by data furnished by the motor manufacturer.

Exception: The standards in this section shall not apply to the following exempt electric motors.

1. Air-over electric motors.
2. Component sets of an electric motor.
3. Liquid-cooled electric motors.
4. Submersible electric motors.
5. Inverter-only electric motors.

Fractional hp fan motors that are 1/12 hp or greater and less than 1 hp (based on output power) which are not covered by Tables C405.8(3) and C405.8(4) shall be electronically commutated motors or shall have a minimum motor efficiency of 70 percent when rated in accordance with DOE 10 CFR 431. These motors shall also have the means to adjust motor speed for either balancing or remote control. Belt-driven fans may use sheave adjustment for airflow balancing in lieu of a varying motor speed.

Exceptions:

1. Motors that are an integral part of specialized process equipment.
2. Where the motor is integral to a listed piece of equipment for which no complying motor has been approved.
3. Motors used as a component of the equipment meeting the minimum efficiency requirements of Section C403.3.2 and Tables C403.3.2(1) through ((~~C403.3.2(12)~~)) C403.3.2(13), provided that the motor input is included when determining the equipment efficiency.
4. Motors in the airstream within fan coils and terminal units that operate only when providing heating to the space served.
5. Fan motors that are not covered by Tables C405.8(1) through C405.8(4) and are used to power heat recovery ventilators, energy recovery ventilators, or local exhaust fans in Group R subject to the efficacy requirements of Section C403.8.4.
6. Domestic clothes dryer booster fans, range hood exhaust fans, and domestic range booster fans that operate intermittently.
7. Radon and contaminated soil exhaust fans.
8. Group R heat recovery ventilator and energy recovery ventilator fans that are less than 400 cfm.

TABLE C405.8(4)
MINIMUM AVERAGE FULL LOAD EFFICIENCY FOR CAPACITOR-START CAPACITOR-RUN AND CAPACITOR-START INDUCTION-RUN SMALL ELECTRIC MOTORS[a]

	OPEN MOTORS		
NUMBER OF POLES ►	2	4	6
SYNCHRONOUS SPEED (RPM) ►	3600	1800	1200
MOTOR HORSEPOWER ▼			
0.25	66.6	68.5	62.2
0.33	70.5	72.4	66.6
0.50	72.4	76.2	76.2
0.75	76.2	81.8	80.2
1	80.4	82.6	81.1
1.5	81.5	83.8	N/A
2	82.9	84.5	N/A
3	84.1	N/A	N/A

a. Average full load efficiencies shall be established in accordance with 10 CFR. 431.

C405.9 Vertical and horizontal transportation systems and equipment. Vertical and horizontal transportation systems and equipment shall comply with this section.

C405.9.1 Elevator cabs. For the luminaires in each elevator cab, not including signals and displays, the sum of the lumens divided by the sum of the watts shall be not less than 35 lumens per watt. Ventilation fans in elevators that do not have their own air conditioning system shall not consume more than 0.33 watts/cfm at the maximum rated speed of the fan. Controls shall be provided that will de-energize ventilation fans and lighting systems when the elevator is stopped, unoccupied and with its doors closed for over 15 minutes.

C405.9.2 Escalators and moving walks. Escalators and moving walks shall comply with ASME A17.1/CSA B44 and shall have *automatic* controls configured to reduce speed to the minimum permitted speed in accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers.

Exception: A variable voltage drive system that reduces operating voltage in response to light loading conditions ((~~may~~)) is permitted to be provided in ((~~place~~)) lieu of the variable speed function.

C405.9.3 Regenerative drive. An escalators designed either for one-way down operation only or for reversible operation shall have a variable frequency regenerative drive that supplies electrical energy to the building electrical system when the escalator is loaded with passengers whose combined weight exceeds 750 pounds.

C405.10 Controlled receptacles. At least 50 percent of all 125 volt 15- and 20-ampere receptacles installed in private offices, open offices, conference rooms, rooms used primarily for printing and/or copying functions, break rooms, individual workstations and classrooms, including those installed in modular partitions and modular office workstation systems, shall be controlled as required by this section. ((~~In rooms larger than 200 square feet (19 m^2),~~)) Either split receptacles shall be provided, with the top receptacle(s) controlled, or a *controlled receptacle* shall be located within ((~~72~~)) 12 inches (((~~1.8~~)) 0.3 m) of each uncontrolled receptacle. *Controlled receptacles* shall be visibly differentiated from standard receptacles using the standard symbol required by the Seattle Electrical Code and shall be controlled by one of the following *automatic control devices:*

1. An occupant sensor that turns receptacle power off when no occupants have been detected for a maximum of 20 minutes.
2. A time-of-day operated control device that turns receptacle power off at specific programmed times and can be programmed separately for each day of the week. The control device shall be configured to provide an independent schedule for each portion of the building not to exceed 5,000 square feet (465 m^2) and not to exceed one full floor. The device shall be capable of being overridden for periods of up to two hours by a timer in a location with *access* to occupants. Any individual override switch shall control the *controlled receptacles* for a maximum area of 5,000 square feet (465 m^2). Override switches for *controlled receptacles* are permitted to control the lighting within the same area.

Exceptions:

1. Receptacles designated for specific equipment requiring 24-hour operation, for building maintenance functions, or for specific safety or security equipment are not required to be controlled by an *automatic control device* and are not required to be located within ((~~72~~)) 12 inches of a *controlled receptacle.*
2. Within a single modular office workstation, non-*controlled receptacles* are permitted to be located more than 12 inches, but not more than 72 inches, from the *controlled receptacles* serving that workstation.

SDCI Informative Note: The requirements of this section also apply to rooms and spaces that have substantially similar functions to those listed even when they are labeled with different names. For example, an area designed for office functions that is labeled "work room," or a room used as a classroom that is labeled "student learning" would each be required to provide *controlled receptacles.*

C405.11 Voltage drop in feeders and branch circuits. The total voltage drop across the combination of feeders and branch circuits shall not exceed five percent.

C405.12 Commissioning. Controlled receptacles and lighting systems shall be commissioned in accordance with Section C408.

SECTION C406
EFFICIENCY PACKAGES

C406.1 Additional energy efficiency credit requirements. New buildings and changes in space conditioning, change of occupancy and building additions in accordance with Chapter 5 shall comply with sufficient packages from Table C406.1 so as to achieve a minimum number of ((~~six~~)) 8 credits. Each area shall be permitted to apply for different packages provided all areas in the building comply with the requirement for ((~~six~~)) 8 credits. Areas included in the same permit within mixed use buildings shall be permitted to demonstrate compliance by an area weighted average number of credits by building occupancy achieving a minimum number of ((~~six~~)) 8 credits.

Exceptions:

1. Low energy spaces in accordance with Section C402.1.1.1 and equipment buildings in accordance with Section C402.1.2 shall comply with sufficient packages from Table C406.1 to achieve a minimum number of ((~~three~~)) 4 credits.
2. Building additions that have less than 1,000 square feet of *conditioned floor area* shall comply with sufficient packages from Table C406.1 to achieve a minimum number of ((~~three~~)) 4 credits.

C406.1.1 Tenant spaces. Initial tenant improvement shall comply with sufficient packages from Table C406.1 to achieve a minimum number of ((~~six~~)) 8 credits when the space is fully built out. In buildings with multiple tenant spaces, each tenant space is permitted to apply for different packages provided all areas in the building comply with the requirement for ((~~six~~)) 8 credits when the space is fully built-out. This provision only applies to the initial buildout of a tenant space.

SDCI Informative Note: In this section "tenant space" means any conditioned area within a new building that is constructed for first occupancy under a separate permit from the shell and core permits.

C406.1.1.1 Applicable envelope and on-site renewable energy credits. Where an entire building or building addition complies with Section C406.5, C406.10 or C406.11, under an initial tenant improvement permit, tenant spaces within the building qualify for the number of credits assigned to the occupancy type of the tenant space in accordance with Table C406.1.

TABLE C406.1
EFFICIENCY PACKAGE CREDITS

Code Section	Commercial Building Occupancy					
	Group R-1	Group R-2	Group B	Group E	Group M	All Other
	Additional Efficiency Credits					
1. More efficient HVAC performance in accordance with Section C406.2	2.0	3.0	3.0	2.0	1.0	2.0
2. Reduced lighting power: Option 1 in accordance with Section C406.3.1	1.0	1.0	2.0	2.0	3.0	2.0
3. Reduced lighting power: Option 2 in accordance with Section C406.3.2[a]	2.0	3.0	4.0	4.0	6.0	4.0
4. Enhanced lighting controls in accordance with Section C406.4	NA	NA	1.0	1.0	1.0	1.0
5. On-site supply of renewable energy in accordance with Section C406.5	3.0	3.0	3.0	3.0	3.0	3.0
5.1. One-third of renewable energy required by Section C406.5	1.0	1.0	1.0	1.0	1.0	1.0
5.2. Two-thirds of renewable energy required by Section C406.5	2.0	2.0	2.0	2.0	2.0	2.0
6. Dedicated outdoor air system in accordance with Section C406.6[b]	4.0	((~~4.0~~)) 2.0[d]	4.0	NA	NA	4.0
7. High performance dedicated outdoor air system in accordance with Section C406.7	4.0	4.0	4.0	4.0	4.0	4.0
8. High-efficiency service water heating in accordance with Sections C406.8.1 and C406.8.2	4.0 NA after 1/1/2022	5.0 NA after 1/1/2022	NA	NA	NA	8.0
9. High performance service water heating in ((~~multi-family~~)) R-1 and R-2 buildings in accordance with Section C406.9	7.0 prior to 1/1/2022 5.0 after 1/1/2022	8.0 prior to 1/1/2022 5.0 after 1/1/2022	NA	NA	NA	NA
10. Enhanced envelope performance in accordance with Section C406.10[c]	3.0	6.0	3.0	3.0	3.0	4.0
11. Reduced air infiltration in accordance with Section C406.11[c]	1.0	2.0	1.0	1.0	1.0	1.0
((~~12. Enhanced commercial kitchen equipment in accordance with Section C406.12~~	~~5.0~~	~~NA~~	~~NA~~	~~NA~~	~~5.0~~	~~5.0 (Group A-2 only)~~))

a. Projects using this option may not use Item 2.
b. This option is not available to buildings subject to the prescriptive requirements of Section C403.3.5 or C403.6.
c. Buildings or building areas that are exempt from thermal envelope requirements in accordance with Sections C402.1.1 and C402.1.2 do not qualify for this package.
d. 4.0 credits, instead of 2.0 credits, are permitted to be applied to areas of R-2 occupancy buildings other than *dwelling units*, including corridors, lobbies and tenant amenity spaces, where those areas comply with the requirements for this credit.

C406.1.1.2 Applicable HVAC and service water heating credits. Where HVAC and service water heating systems and services are installed and comply with Section C406.2 or C406.8 under an initial tenant improvement permit, those systems and services shall be considered a part of the tenant space. Tenant spaces qualify for the credits assigned to the occupancy type of the tenant space in accordance with Table C406.1 if the tenant space includes the distribution system and equipment that the central HVAC systems or service water heating systems were designed to support.

Exception: Previously occupied tenant spaces in existing buildings that comply with this code in accordance with Section C501.

C406.2 More efficient HVAC equipment and fan performance. No less than 90 percent of the total HVAC capacity serving the total *conditioned floor area* of the entire building, building *addition*, building area, occupancy type, or tenant space in accordance with Section C406.1.1, shall comply with Sections C406.2.1 through C406.2.3. ((~~For~~)) In addition, systems required to comply with Section C403.1.1, HVAC total system performance ratio, shall exceed the ((~~minimum requirement~~)) HVAC TSPR of the *standard reference design* by 10 percent. This credit shall not be utilized for low energy or semi-heated space conditioning categories.

((~~**Exception:** In low energy spaces complying with Section C402.1.1 and semi-heated spaces complying with Section C402.1.1.2, no less than 90 percent of the installed heating capacity is provided by electric infrared or gas-fired radiant heat-~~

~~ing equipment for localized heating applications. Stand-alone supply, return and exhaust fans shall comply with Section C406.2.3.~~))

C406.2.1 HVAC system selection. Equipment installed shall be types that are listed in Tables C403.3.2(1) through ((~~C403.3.2(12)~~)) C403.3.2(13) or a combination thereof. Electric resistance heating does not meet this requirement. No HVAC systems incorporating fossil fuel-fired equipment, or heat from district energy systems that are primarily heated by fossil fuel combustion, are permitted to utilize this credit.

((~~**Exception:** Allowed equipment not listed in Tables C403.3.2(1) through C403.3.2(12):~~

~~1. Air-to-water heat pumps.~~

~~2. Heat recovery chillers.~~))

C406.2.2 Minimum equipment efficiency. Equipment shall exceed the minimum efficiency requirements listed in Tables C403.3.2(1) through ((~~C403.3.2(12)~~)) C403.3.2(13) by 15 percent, in addition to the requirements of Section C403. Where multiple performance requirements are provided, the equipment shall exceed all requirements by 15 percent.

Exceptions:

1. Equipment that is larger than the maximum capacity range indicated in Tables C403.3.2(1) through ((~~C403.3.2(12)~~)) C403.3.2(13) shall utilize the values listed for the largest capacity equipment for the associated equipment type shown in the table.
2. Equipment complying with the exception to Section C406.2.1 is not required to comply with the minimum equipment efficiency requirement.
3. Compliance may be demonstrated by calculating a total weighted average percentage for all heating and cooling equipment combined. All equipment shall have efficiency that is no less than 5 percent better than the minimum required efficiency in Tables C403.3.2(1) through ((~~C403.3.2(12)~~)) C403.3.2(13), and the resulting weighted average percentage for all equipment performance requirements shall exceed 15 percent. Calculation shall include heating and cooling capacities for all equipment, percentage better or worse than minimum required efficiency per Tables C403.3.2(1) through ((~~C403.3.2(12)~~)) C403.3.2(13) for each performance requirement (SEER, EER/IEER, COP, HSPF, Et, Ec and AFUE), and the total weighted average efficiency percentage.

((~~4. Hot water boilers with input capacity greater than 2,500,000 Btu/h shall be considered to comply with this section with a minimum thermal efficiency of 95 percent Et per the test procedure in 10 CFR Part 431.~~))

C406.2.3 Minimum fan efficiency. Stand-alone supply, return and exhaust fans designed for operating with motors over 750 watts (1 hp) shall have a fan efficiency grade of not less than FEG 71 as defined in AMCA 205. The total efficiency of the fan at the design point of operation shall be within 10 percentage points of either the maximum total efficiency of the fan or the static efficiency of the fan.

C406.3 Reduced lighting power. Interior lighting within the whole building, building area, occupancy type, building *addition* or tenant space shall comply with Section C406.3.1 or C406.3.2. *Dwelling units* and sleeping units within the building shall comply with Section C406.3.3.

C406.3.1 Reduced lighting power option 1. The total connected interior lighting power calculated in accordance with Section C405.4.1 shall be 90 percent or less of the lighting power values specified in Table C405.4.2(1) times the floor area for the building types, or by using 90 percent or less of the total interior lighting power allowance calculated in accordance with Section C405.4.2.

C406.3.2 Reduced lighting power option 2. The total connected interior lighting power calculated in accordance with Section C405.4.1 shall be 80 percent or less of the lighting power values specified in Table C405.4.2(1) times the floor area for the building types, or by using 80 percent or less of the total interior lighting power allowance calculated in accordance with Section C405.4.2.

C406.3.3 Lamp fraction. No less than 95 percent of the permanently installed light fixtures in *dwelling units* and sleeping units shall be provided by high efficacy lamps with a minimum efficacy of 65 lumens per watt. Where the conditioned floor area of residential dwelling units or sleeping units is separated from other building occupancies or building areas for the purposes of the C406 area weighted credit calculation, these dwelling or sleeping unit areas receive the credit weighting for reduced lighting power Option 1, referencing Section C406.3.1, in Table C406.1.

C406.4 Enhanced digital lighting controls. ((~~No~~)) Not less than 90 percent of the total installed interior lighting power within the whole building, building *addition* or tenant space shall comply with Section C406.4.1. Open office areas subject to Section C405.2 (1) are not permitted to take credit for this option.

C406.4.1 Lighting controls function. Interior lighting shall be located, scheduled and operated in accordance with Section C405.2, and shall be configured with the following enhanced control functions:

1. Luminaires shall be configured for continuous dimming.
2. Each luminaire shall be individually addressed.

Exceptions to Item 2:

1. Multiple luminaires mounted on no more than 12 linear feet of a single lighting track and addressed as a single luminaire.
2. Multiple linear luminaires that are ganged together to create the appearance of a single longer fixture and addressed as a single luminaire, where the total length of the combined luminaires is not more than 12 feet.
3. No more than eight luminaires within a *daylight zone* are permitted to be controlled by a single *daylight responsive control.*
4. Luminaires shall be controlled by a digital control system configured with the following capabilities:
   - 4.1. Scheduling and illumination levels of individual luminaires and groups of luminaires are capable of being reconfigured through the system.
   - 4.2. Load shedding.
   - 4.3. In open and enclosed offices, the illumination level of overhead general illumination luminaires are configured to be individually adjusted by occupants.
   - 4.4. Occupancy sensors and daylight responsive controls are capable of being reconfigured through the system.
5. Construction documents shall include submittal of a Sequence of Operations, including a specification outlining each of the functions required by this section.
6. These control functions shall be commissioned in accordance with Sections C408.1 and C408.3.

C406.5 On-site renewable energy. ((~~A~~)) In addition to the renewable energy required by Section C412 and to renewable energy used to comply with any other requirement of this code, a whole building, building *addition*, building area, occupancy type, or tenant space shall be provided with on-site renewable energy systems with ((~~an annual production per square foot~~)) a rated peak renewable energy generating capacity of no less than ((~~the value specified in Table C406.5~~)) 0.25 watts (or 0.85 BTU/h) per square foot of *conditioned floor area* based on the total *conditioned floor area* of the whole building, building *addition* or tenant space. The on-site renewable ((~~used in~~)) provided to comply with this option shall be separate from on-site renewables ((~~used as part of Section C406.7~~)) provided to comply with C406.8 or used to qualify for any exception in this code.

~~((TABLE C406.5~~
~~ON-SITE RENEWABLE ENERGY SYSTEM RATING~~
~~(PER SQUARE FOOT)~~

~~Building Area Type~~	~~kBTU per year~~	~~kWh per year~~
~~Assembly~~	~~1.8~~	~~0.53~~
~~Dining~~	~~10.7~~	~~3.14~~
~~Hospital~~	~~3.6~~	~~1.06~~
~~Hotel/Motel~~	~~2.0~~	~~0.59~~
~~Multi-family residential~~	~~0.50~~	~~0.15~~
~~Office~~	~~0.82~~	~~0.24~~
~~Other~~	~~2.02~~	~~0.59~~
~~Retail~~	~~1.31~~	~~0.38~~
~~School/University~~	~~1.17~~	~~0.34~~
~~Supermarket~~	~~5.0~~	~~1.47~~
~~Warehouse~~	~~0.43~~	~~0.13~~))

C406.6 Dedicated outdoor air system (DOAS). No less than 90 percent of the total *conditioned floor area* of the whole building, building area, occupancy type, building *addition* or tenant space, excluding floor area of unoccupied spaces that do not require ventilation per the *International Mechanical Code,* shall be served by DOAS installed in accordance with Section C403.3.5. This option is not available to buildings subject to the prescriptive requirements of Section C403.3.5. No HVAC systems incorporating fossil fuel-fired equipment, or heat from district energy systems that are primarily heated by fossil fuel combustion, are permitted to utilize this credit.

C406.7 High performance dedicated outdoor air system (DOAS). A whole building, building area, occupancy type, building *addition* or tenant space which includes a DOAS complying with Section C406.6 shall also provide minimum sensible effectiveness of heat recovery of 80 percent and DOAS total combined fan power less than 0.5 W/cfm of outdoor air. For the purposes of this section, total combined fan power includes all supply, exhaust, recirculation and other fans utilized for the purpose of ventilation. No HVAC systems incorporating fossil fuel-fired equipment, or heat from district energy systems that are primarily heated by fossil fuel combustion, are permitted to utilize this credit.

C406.8 Reduced energy use in service water heating. Buildings with service hot water heating equipment that serves the whole building, building *addition* or tenant space shall comply with Sections C406.8.1 and C406.8.2. No service water heating systems incorporating fossil fuel-fired equipment, or heat from district energy systems that are primarily heated by fossil fuel combustion, are permitted to utilize this credit.

C406.8.1 Building type. Not less than 90 percent of the *conditioned floor area* of the whole building, building area, occupancy type, building *addition* or tenant space shall be of the following types:

1. Group R-1: Boarding houses, hotels or motels. (Not applicable after 1/1/2022)
2. Group I-2: Hospitals, psychiatric hospitals and nursing homes.
3. Group A-2: Restaurants and banquet halls or buildings containing food preparation areas.
4. Group F: Laundries.
5. Group R-2. (Not applicable after 1/1/2022)
6. Group A-3: Health clubs and spas.
7. Buildings with a service hot water load of 10 percent or more of total building energy loads, as shown with an energy analysis as described in Section C407 or as shown through alternate service hot water load calculations showing a minimum service water energy use of 15 k/Btu per square foot per year, as approved by the building official.

C406.8.2 Load fraction. Not less than 60 percent of the annual service hot water heating energy use, or not less than 100 percent of the annual service hot water heating energy use in buildings with water-cooled systems subject to the requirements of Section C403.9.5 or qualifying for one of its exceptions, shall be provided by one or more of the following:

1. Service hot water system delivering heating requirements using heat pump technology with a minimum COP of 3.0. For air-source equipment, the COP rating will be reported at the design leaving heat pump water temperature with an entering air temperature of 60°F (15.6°C) or lower. For water-source equipment, the COP rating will be reported at the design leaving load water temperature with an entering water temperature of 74°F (23.3°C) or lower.
2. Waste heat recovery from service hot water, heat recovery chillers, building equipment, process equipment, or other *approved* system. Qualifying heat recovery must be above and beyond heat recovery required by other sections of this code.
3. On site renewable energy water-heating systems, where those systems are in addition to the renewable energy required by Section C412 and any renewable energy used to comply with other requirements of this code.

C406.9 High performance service water heating in hotel and multifamily buildings. For a whole building, building area, occupancy type, building *addition*, or tenant space with not less than 90 percent of the *conditioned floor area* being Group R-1 or R-2 occupancy, not less than 90 percent of the annual building service hot water energy use shall be provided by a heat pump system ((~~with a minimum COP of 3.0.~~)) meeting the requirements of Section C404.2.3 plus the following:

1. The refrigerant used in the heat pump system shall have a global warming potential (GWP) no greater than 675.
2. No electric resistance heating capacity shall be provided.

   Exceptions to item 2:

   1. Electric resistance heating is permitted for circulating system *temperature maintenance* and heat tracing of service hot water supply and return piping.
   2. On-demand electric resistance water heaters for hand washing facilities are permitted in public toilet rooms.

((~~This~~)) Prior to January 1, 2022, this efficiency package is allowed to be taken in addition to Section ((~~C406.8.2~~)) C406.8.

C406.10 Enhanced envelope performance. The Proposed Total UA of the thermal envelope of the whole building, building area, occupancy type, or building *addition* shall be 15 percent lower than the Allowable Total UA for an area of identical configuration and fenestration area in accordance with Section C402.1.5 and Equation 4-2. Where exception 3 for Section C412 is also being used, the Proposed Total UA shall be 30 percent lower than the Allowable Total UA as defined in Section C402.1.5.

C406.11 Reduced air ((~~infiltration~~)) leakage. Measured air infiltration of the total *conditioned floor area* of the whole building, fully isolated building *addition*, ((~~or tenant space~~)) building area, or occupancy type shall comply with Section C406.11.1.

C406.11.1 Air leakage testing and verification. Air ((~~infiltration~~)) leakage shall be verified by whole building pressurization testing conducted in accordance with ASTM E779 or ASTM E1827, or an equivalent method *approved* by the *code official*, by an independent third party. The measured air leakage rate of the *building envelope* shall not exceed 0.17 cfm/ft^2 under a pressure differential of 0.3 in. water (75 Pa), with the calculated surface area being the sum of the above and below grade building envelope. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to the code official and the building owner.

~~((**Exception:** Where the *conditioned floor area* of the building is not less than 250,000 ft^2 (25,000 m^2), air leakage testing shall be permitted to be conducted on representative above grade sections of the building provided the *conditioned floor*~~

~~*area* of tested areas is no less than 25 percent of the *conditioned floor area* of the building and are tested in accordance with this section.~~))

((~~**C406.12 Enhanced commercial kitchen equipment.** For buildings and spaces designated as Group A-2, or facilities whose primary business type involves the use of a commercial kitchen with at least one gas or electric fryer, all fryers, dishwashers, steam cookers and ovens shall comply with all of the following:~~

~~1. Achieve the ENERGY STAR label in accordance with the specifications current as of January 1, 2018.~~

~~2. Be installed prior to the issuance of the certificate of occupancy.~~

~~3. Have the ENERGY STAR qualified model number listed on the construction documents submitted for permitting.~~))

SDCI Informative Note: Energy Star commercial kitchen equipment is required for all commercial kitchen projects by Section C403.15.

SECTION C407
TOTAL BUILDING PERFORMANCE

C407.1 Scope. This section establishes criteria for compliance using total building performance. All systems and loads shall be included in determining the total building performance including, but not limited to: Heating systems, cooling systems, service water heating, fan systems, lighting power, receptacle loads and process loads.

Exception: Energy used to recharge or refuel vehicles that are used for on-road and off-site transportation purposes.

C407.2 Mandatory requirements. Compliance with ((~~this section~~)) Section C407 also requires compliance with those sections shown in Table C407.2.

The building permit application for projects utilizing this method shall include in one submittal all building and mechanical drawings and all information necessary to verify that the building envelope and mechanical design for the project corresponds with the annual energy analysis. If credit is proposed to be taken for lighting energy savings, then an electrical permit application shall also be submitted and approved prior to the issuance of the building permit. If credit is proposed to be taken for energy savings from other components, then the corresponding permit application (e.g., plumbing, boiler, etc.) shall also be submitted and approved prior to the building permit application. Otherwise, components of the project that would not be approved as part of a building permit application shall be modeled the same in both the proposed building and the *standard reference design* and shall comply with the requirements of this code.

C407.3 Performance-based compliance. Compliance with this section requires compliance with ASHRAE Standard 90.1 Appendix G, Performance Rating Method, in accordance with Standard 90.1 Section 4.2.1 with the following modifications: ((~~.~~))

1. The mandatory requirements of Section G1.2.1a of Standard 90.1 are not required to be met.
2. The reduction in annual carbon emissions of the proposed building design associated with on-site renewable energy shall not be more than 3 percent of the total carbon emissions of the baseline building design. This limitation only applies to on-site renewable energy provided in excess of the renewable energy required by Section C412.
   a. The equation PCI + [(PBP$_{nre}$ – PBP)/BBP] – 0.05 < PCIt in Section 4.2.1.1 shall be modified to read PCI + [(PBP$_{nre}$ – PBP)/BBP] – 0.03 < PCIt.
   b. The term PBP$_{nre}$ shall be defined as the proposed building performance without credit for reduced annual energy emissions from on-site renewable energy generation system capacity in excess of that installed to satisfy the requirements of Section C412.
3. References to energy cost in Section 4.2.1.1 and Appendix G shall be replaced by carbon emissions calculated by multiplying site energy consumption by the carbon emission factor from Table C407.3(1).
4. The building performance factors in Table C4.2.1.1 shall be replaced with those in Table C407.3(2).
5. Schedules and plug and process loads shall be modeled using the default values listed in Appendix B or in the ASHRAE 90.1 User's Manual and shall be assumed to be identical in the proposed design and baseline building design.

   Exception to item 5: Alternative schedules and plug and process loads shall be permitted where *approved* by the *code official.*
6. Documentation requirements in Section G1.3.2.d shall be replaced by a list showing compliance with the mandatory provisions of Table C407.2.
7. Documentation requirements in Section G1.3.2.e shall be replaced by a list of aspects of the proposed design that are less stringent than the prescriptive requirements of the Seattle Energy Code.
8. References to yet-to-be-designed future building components in the Proposed Building Performance column of Table G3.1 shall be modified to reference the corresponding sections of the Seattle Energy Code in lieu of the requirements of Standard 90.1, in the following sections of the table:

1. Design Model, subclause c.
6. Lighting, subclause c.
11. Service Water-Heating Systems, subclause c.
12. Receptacle and Other Loads, subclause b.

9. HVAC Systems, subclauses c and d of Table G3.1, shall meet the following requirements:

   a. For yet-to-be-designed systems in office, retail, library, education, and multifamily buildings and occupancies subject to the TSPR requirements of Section C403.1.1, the system type and efficiency parameters shall meet but not exceed those shown in Table D602.11 Standard Reference Design HVAC Systems.

   b. For all other buildings and occupancies, the system type shall be the same as the system modeled in the baseline design, and shall comply with but not exceed the requirements of Section C403 in lieu of Standard 90.1.

   c. For HVAC systems serving future tenant spaces, where the current building permit applies to only a portion of an HVAC system, and future components will receive HVAC services from systems included in the current building permit, those future components shall be modeled as the type required to complete the HVAC system portions under the current permit and shall meet but not exceed the requirements found in Section C403.

SDCI Informative Note: The permit applicant is encouraged to schedule a pre-application meeting to discuss the modeling approach for any yet-to-be designed areas that are not included in the C407 permit submissions. In general, future permit submissions should not contribute energy savings to the C407 submission beyond prescriptive code requirements, assuming use of the base building HVAC systems. Future systems must be modeled for the base building permit as being no better than the current prescriptive code, because plans often change and the City does not have a mechanism for ensuring that future tenant projects meet any beyond-code performance modeled in the original C407 submission.

TABLE C407.2
MANDATORY COMPLIANCE MEASURES FOR TOTAL BUILDING PERFORMANCE METHOD
AND TARGET PERFORMANCE PATH[a]

Section	Title	Comments
	Envelope	
C402.5	Air Leakage	
	Mechanical	
C403.1.2	Calculation of heating and cooling loads	
C403.1.3	*Data centers*	
C403.1.4	Use of electric resistance and fossil fuel-fired heating equipment	
C403.2	System design	
C403.3.1	Equipment and system sizing	
C403.3.2	HVAC equipment performance requirements	
C403.3.6	Ventilation for Group R occupancy	
C403.3.7	Hydronic system flow rate	
C403.4	HVAC system controls	
C403.4.1	Thermostatic controls	Except for C403.4.1.4
C403.4.2	Off-hour controls	Except for Group R
C403.4.7	Combustion heating equipment controls	
C403.4.8	Group R-1 hotel/motel guestrooms	See Section C403.7.4
C403.4.9	Group R-2 and R-3 dwelling units	
C403.4.10	Group R-2 sleeping units	
C403.4.11	Direct digital control systems,	
C403.4.12	Pressure independent control valves	
C403.5.5	Economizer fault detection and diagnostics (FDD)	
C403.7	Ventilation and exhaust systems	Except for C403.7.6
C403.8	Fan and fan controls	
C403.9.1	Heat rejection equipment (partial)	Only the prohibition on single-pass water cooling systems is mandatory
C403.9.1.1	Variable flow controls	For cooling tower fans ≥ 7.5 hp
C403.9.1.2	Limitation on centrifugal fan cooling towers	For open cooling towers
C403.10	Construction of HVAC elements	
C403.11	Mechanical systems located outside of the building thermal envelope	
C403.15	Commercial food service	
	Service Water Heating	
C404	Service Water Heating	
	Lighting and Electrical	
C405.1	General	
C405.2	Lighting controls	
C405.3	Exit signs	
C405.4	Interior lighting power	
C405.5	Exterior building lighting power	
C405.6	Electrical transformers	
C405.7	Dwelling unit energy consumption	
C405.8	Electric motor efficiency	
C405.9	Vertical and horizontal transportation	
C405.10	Controlled receptacles	
C405.11	Voltage drop in feeders	
	Other Requirements	
C407	Total Building Performance	
C408	System commissioning	
C409	Energy metering	
C410	Refrigeration requirements	

TABLE C407.2
MANDATORY COMPLIANCE MEASURES FOR TOTAL BUILDING PERFORMANCE METHOD
AND TARGET PERFORMANCE PATH[a]

Section	Title	Comments
C411	Solar readiness	
C412	Renewable energy	All on-site renewable energy production is included in the proposed building performance, but not in the baseline building performance.

a. Compliance with any of these sections includes compliance with any exception to that section.

TABLE C407.3(1)
CARBON EMISSIONS FACTORS

Type	CO2e (lb/unit)	Unit
Electricity	0.70	kWh
Natural Gas	11.7	Therm
Oil	19.2	Gallon
Propane	10.5	Gallon
Other[a]	195.00	mmBtu
On-site renewable energy[b]	0.00	

a. District energy systems may use alternative emission factors supported by calculations approved by the *code official.*
b. The TSPR calculation does not separately account for the use of renewable energy.

TABLE C407.3(2)
BUILDING PERFORMANCE FACTORS (BPF) TO BE USED FOR COMPLIANCE WITH SECTION C407.3

Building Area Type	Building Performance Factor
Multifamily	((~~0.58~~)) 0.52
Healthcare/hospital	((~~0.54~~)) 0.49
Hotel/motel	((~~0.64~~)) 0.58
Office	((~~0.56~~)) 0.51
Restaurant	((~~0.70~~)) 0.63
Retail	((~~0.47~~)) 0.43
School	((~~0.36~~)) 0.32
Warehouse	((~~0.48~~)) 0.43
All Others	((~~0.54~~)) 0.49

C407.3.1 Limits on ((~~non-mandatory measures~~)) substandard building envelopes. The Proposed Total UA of the proposed building shall be no more than ((~~20~~)) 10 percent higher than the Allowed Total UA as defined in Section C402.1.5. Where either Section C402.4.1.1.1 or C402.4.1.1.2 is used to establish the maximum allowable fenestration area for compliance with this section, all of the requirements of the selected section shall be met.

SECTION C408
SYSTEM COMMISSIONING

C408.1 General. A building commissioning process led by a *certified commissioning professional* and functional testing requirements shall be completed for mechanical systems in Section C403; service water heating systems in Section C404; controlled receptacle and lighting control systems in Section C405; equipment, appliance and systems installed to comply with Section C406 or C407; ((~~senergy~~)) energy metering in Section C409; and refrigeration systems in Section C410.

Exception: Buildings, or portions thereof, which are exempt from Sections C408.2 through C408.7 may be excluded from the commissioning process.

1. Mechanical systems are exempt from the commissioning process where the installed total mechanical equipment capacity is less than 240.000 Btu/h cooling capacity and less than 300,000 Btu/h heating capacity.
2. Service water heating systems are exempt from the commissioning process in buildings where the largest service water heating system capacity is less than 200,000 Btu/h and where there are no pools or permanent spas.
3. Lighting control systems are exempt from the commissioning process in buildings where both the total installed lighting load is less than 20 kW and the lighting load controlled by occupancy sensors or *automatic* daylighting controls is less than 10 kW.

4. Refrigeration systems are exempt from the commissioning process if they are limited to self-contained units.

C408.1.1 Commissioning in construction documents. Construction documents shall clearly indicate provisions for commissioning process. The construction documents shall minimally include the following:

1. A narrative description of the activities that will be accomplished during the commissioning process. At a minimum, the commissioning process is required to include:
   1.1. Development and execution of the commissioning plan, including all subsections of Section C408.1.2;
   1.2. The *certified commissioning professional's* review of the building documentation and close out submittals in accordance with Section C103.6; and
   1.3. The commissioning report in accordance with Section C408.1.3.
2. Roles, responsibilities and required qualifications of the *certified commissioning professional.*
3. A listing of the specific equipment, appliances or systems to be tested.

C408.1.2 Commissioning plan. A *commissioning plan* shall be developed by the project's *certified commissioning professional* and shall outline the organization, schedule, allocation of resources, and documentation requirements of the commissioning process. The plan shall also include the following:

1. A narrative description of the activities that will be accomplished during each phase of commissioning, including the personnel intended to accomplish each of the activities, systems testing and balancing, functional performance testing, and verification of the building documentation requirements in Section C103.6.
2. Roles and responsibilities of the commissioning team, including the name and statement of qualifications of the *certified commissioning professional.*
3. A listing of the specific equipment, appliances or systems to be tested and a description of the tests to be performed.

C408.1.2.1 In-house commissioning disclosure and conflict management plan. Where the *certified commissioning professional's* contract or employment is other than directly with the building owner, an in-house commissioning disclosure and conflict management plan shall be a part of the commissioning process. A copy shall be included in the commissioning plan. This plan shall disclose the *certified commissioning professional's* contractual relationship with other team members and provide a conflict management plan demonstrating that the *certified commissioning professional* is free to identify any issues discovered and report directly to the owner.

C408.1.2.2 Functional performance testing. Functional performance testing shall be conducted for mechanical systems in Sections C403; service water heating systems in Section C404; controlled receptacles and lighting control systems in Section C405; equipment, appliances and systems installed to comply with Section C406 or C407; energy metering in Section C409; and refrigeration systems in Section C410. Written procedures which clearly describe the individual systematic test procedures, the expected system response or acceptance criteria for each procedure, the actual response or findings, and any pertinent discussion shall be followed. This testing shall include control systems which will be tested to document that control devices, components, equipment, and systems are calibrated and adjusted to operate in accordance with approved construction documents. Testing shall affirm the conditions required within Sections C408.2 through C408.7 under system testing.

C408.1.2.3 Functional performance testing - sampling. For projects with seven or fewer similar systems, each system shall be tested. For projects with more than seven systems, testing shall be done for each unique combination of controls type. Where multiples of each unique combination of control types exist, no fewer than 20 percent of each combination shall be tested unless the *code official* or design professional requires a higher percentage to be tested. Where 30 percent or more of the tested system fail, all remaining identical combinations shall be tested.

C408.1.2.4 Deficiencies. Deficiencies found during testing shall be resolved including corrections and retesting.

C408.1.3 Commissioning report. A commissioning report shall be completed and certified by the *certified commissioning professional* and delivered to the building owner or owner's authorized agent. The report shall be organized with mechanical, service water heating, controlled receptacle and lighting control systems, energy metering, and refrigeration findings in separate sections to allow independent review. The report shall record the activities and results of the commissioning process and be developed from the final commissioning plan with all of its attached appendices. The report shall include:

1. Results of functional performance tests.
2. Disposition of deficiencies found during testing, including details of corrective measures used or proposed.
3. Functional performance test procedures used during the commissioning process including measurable criteria for test acceptance, provided herein for repeatability.
4. Commissioning plan.
5. Testing, adjusting and balancing report.

Exception: Deferred tests which cannot be performed at the time of report preparation due to climatic conditions.

FIGURE C408.1.4.1
COMMISSIONING COMPLIANCE CHECKLIST

Project Information	**Project Name:** **Project Address:** **Certified Commissioning Professional:** **Type of ISO Certification and Number:**
Supporting Documents	❑ **Manuals, record documents and training have been completed or are scheduled** (Section C103.6) • Building operations and maintenance information (C103.6.2) have been submitted to the owner or scheduled date:_____ • Manuals (C103.6.2.1) have been submitted to the owner or scheduled date: _____ • Compliance documentation (C103.6.3) has been provided to the owner or scheduled date: _____ • System operation training (C103.6.4) has been provided to the owner or scheduled date: _____
Commissioning Plan	❑ **Commissioning Plan was used during construction** (Section C408.1.2)
Commissioning Report	❑ **Commissioning Report has been submitted** (Section C408.1.3)
Commissioned Systems	❑ **Mechanical Systems were included in the commissioning process** (Section C408.2) ❑ Testing, adjusting and balancing is complete (Section C408.2.2) ❑ There are unresolved deficiencies with the mechanical systems. These are described in the attached Commissioning Report submitted to the Owner.
	❑ **Service Water Heating Systems were included in the commissioning process** (Section C408.3) ❑ There are unresolved deficiencies with the service water heating systems. These are described in the attached Commissioning Report submitted to the Owner.
	❑ **Controlled receptacles and lighting control systems were included in the commissioning process** (Section C408.4) ❑ There are unresolved deficiencies with the electrical power and/or automatic lighting controls. These are described in the attached Commissioning Report submitted to the Owner.
	❑ **Additional systems were included in the commissioning process** (Section C408.5) ❑ There are unresolved deficiencies with systems required by C406 or C407. These are described in the attached Commissioning Report submitted to the Owner.
	❑ **Metering systems were included in the commissioning process** (Section C408.6) ❑ There are unresolved deficiencies with the metering system. These are described in the attached Commissioning Report submitted to the Owner.
	❑ **Refrigeration systems were included in the commissioning process** (Section C408.7) ❑ There are unresolved deficiencies with systems required by Section C410. These are described in the attached Commissioning Report submitted to the Owner.
Certification	❑ I hereby certify that requirements for Section C408 System Commissioning have been completed in accordance with the Washington State Energy Code, including all items above. _____ Certified Commissioning Professional Date
	❑ I hereby certify that requirements for Section C408 System Commissioning have been completed in accordance with the Washington State Energy Code, including all items above. _____ Building Owner or Owner's Representative Date

SDCI Informative Note: An electronic version of the Commissioning Compliance Checklist is available on the SDCI Seattle Energy Code web page.

C408.2.2 Systems adjusting and balancing. HVAC systems shall be balanced in accordance with generally accepted engineering standards. Air and water flow rates shall be measured and adjusted to deliver final flow rates within the tolerances provided in the project specifications. Test and balance activities shall include air system and hydronic system balancing.

C408.2.2.1 Air systems balancing. Each supply air outlet and *zone* terminal device shall be equipped with means for air balancing in accordance with the requirements of Chapter 6 of the *International Mechanical Code.* Discharge dampers used for air system balancing are prohibited on constant volume fans and variable volume fans with motors 10 hp (18.6 kW) and larger. Air systems shall be balanced in a manner to first minimize throttling losses then, for fans with system power of greater than 1 hp (0.74 kW), fan speed shall be adjusted to meet design flow conditions.

Exception: Fans with fan motors of 1 hp (0.74 kW) or less.

C408.2.2.2 Hydronic systems balancing. Individual hydronic heating and cooling coils shall be equipped with means for balancing and measuring flow. Hydronic systems shall be proportionately balanced in a manner to first minimize throttling losses, then the pump impeller shall be trimmed or pump speed shall be adjusted to meet design flow conditions. Each

hydronic system shall have either the capability to measure pressure across the pump, or test ports at each side of each pump.

Exception: The following equipment is not required to be equipped with means for balancing or measuring flow:

1. Pumps with pump motors of 5 hp (3.7 kW) or less.
2. Where throttling results in no greater than five percent of the nameplate horsepower draw above that required if the impeller were trimmed.

C408.2.3 System testing. Functional performance testing shall demonstrate the components, systems, and system-to-system interfacing relationships are installed and operate in accordance with approved construction documents. Testing shall include the *sequence of operation,* and be conducted under full-load, part-load and the following conditions:

1. All modes as described in the *sequence of operation;*
2. Redundant or *automatic* back-up mode;
3. Performance of alarms; and
4. Mode of operation upon a loss of power and restoration of power.

C408.3 Service water heating systems commissioning. Service water heating equipment and controls subject to Section C404 shall be included in the commissioning process required by Section C408.1. The commissioning process shall minimally include equipment and components installed to meet all energy code requirements for devices to "start," "automatically turn off," "automatically adjust," "limit operation," and "limit the temperature" and "be configured to." **

C408.3.1 System testing. Functional performance testing shall demonstrate that heaters, piping, distribution systems, and system-to-system interfacing relationships are installed and operate in accordance with approved construction documents. Testing shall include the *sequence of operation,* and be conducted under at least 50 percent water heating load, part-load and the following conditions: **

1. Normal operation;
2. Redundant or *automatic* back-up mode;
3. Performance of alarms; and
4. Mode of operation upon a loss of power and restoration of power.

C408.4 Controlled receptacle and lighting control system commissioning. Controlled receptacles and lighting control systems subject to Section C405 shall be included in the commissioning process required by Section C408.1. The configuration and function of controlled receptacles and lighting control systems required by this code shall be tested and shall comply with Section C408.4.1.

Exception: Lighting control systems <u>and controlled receptacles</u> are exempt from the commissioning process in buildings where:

1. The total installed lighting load is less than 20 kW, and
2. The lighting load controlled by occupancy sensors or *automatic* daylighting controls is less than 10 kW.

C408.4.1 System testing. Functional performance testing shall demonstrate that occupant sensors, time switches, manual overrides, night sweep-off, *daylight responsive control,* and *controlled receptacles* are installed and operate in accordance with *approved* construction documents. Testing shall include the *sequence of operation* and be conducted under the following conditions:

1. Normal operation;
2. Redundant or *automatic* back-up mode;
3. Performance of alarms; and
4. Mode of operation upon a loss of power and restoration of power.

C408.5 Systems installed to meet Section C406 or C407. Equipment, components, controls or configuration settings for systems which are included in the project to comply with Section C406 or C407 shall be included in the commissioning process required by Section C408.1.

C408.5.1 System testing. Functional performance testing for these appliances, equipment, components, controls and/or configuration settings shall demonstrate operation, function and maintenance serviceability for each of the commissioned systems in accordance with the *approved* construction documents.

C408.6 Metering system commissioning. Energy metering systems required by Section C409 shall comply with Section C408.6 and be included in the commissioning process required by Section C408.1. The commissioning process shall include all energy metering equipment and controls required by Section C409.

C408.6.1 System testing. Functional performance testing shall demonstrate that energy source meters, end-use meters, *data acquisition systems,* and energy displays are installed and operate in accordance with *approved* construction documents. At a minimum, testing shall confirm that:

1. The metering system devices and components work properly under low and high load conditions.
2. The metered data is delivered in a format that is compatible with the data collection system.
3. The energy display is in a location with *access* to building operation and management personnel.
4. The energy display meets code requirements regarding views required in Section C409.4.3. The display shows energy data in identical units (e.g., kWh).

C408.7 Refrigeration system commissioning. All installed refrigeration systems subject to Section C410 shall be included in the commissioning process required by Section C408.1.

Exceptions:

1. Self-contained refrigeration systems are exempt from the commissioning process.
2. Total installed capacity for refrigeration is equal to or less than 240 kBtu/h.

C408.7.1 System Testing. Functional performance testing shall demonstrate that compressors, heat exchangers, piping, distribution systems, and system-to-system interfacing relationships are installed and operate in accordance with *approved* construction documents. Testing shall include the *sequence of operation* and be conducted under full-load at, part-load and the following conditions:

1. Normal mode;
2. Redundant or *automatic* back-up mode;
3. Performance of alarms; and
4. Mode of operation upon a loss of power and restoration of power.

SECTION C409
ENERGY METERING AND ENERGY CONSUMPTION MANAGEMENT

C409.1 General. All new buildings and additions shall have the capability of metering source energy for on-site renewable energy production in accordance with Section C409.2.4 and the end-use energy usage for electric vehicle charging in accordance with Section C409.3.4. New buildings and additions with a gross *conditioned floor area* over ((~~50,000~~)) 20,000 square feet shall comply with Section C409. Buildings shall be equipped to measure, monitor, record and display energy consumption data for each energy source and end use category per the provisions of this section, to enable effective energy management. For Group R-2 buildings, the floor area of *dwelling units* and sleeping units shall be excluded from the total *conditioned floor area* for the purposes of determining the 20,000 square foot threshold. *Alterations* and *additions* to existing buildings shall conform to Section C506.

Exceptions:

1. Tenant spaces smaller than ((~~50,000~~)) 20,000 ft^2 within buildings if the tenant space has its own utility service and utility meters.
2. Buildings in which there is no gross *conditioned floor area* over ((~~25,000~~)) 10,000 square feet, including building common area, that is served by its own utility services and meters.

C409.1.1 Alternate metering methods. Where approved by the building official, energy use metering systems may differ from those required by this section, provided that they are permanently installed and that the source energy measurement, end use category energy measurement, data storage and data display have similar accuracy to and are at least as effective in communicating actionable energy use information to the building management and users, as those required by this section.

C409.1.2 Conversion factor. Any threshold stated in kW or kVA shall include the equivalent BTU/h heating and cooling capacity of installed equipment at a conversion factor of 3,412 Btu per kW ((~~at 50 percent demand~~)) or 2,730 Btu per kVA.

SDCI Informative Note: Seattle's "Building Tune-ups" ordinance will continue to be phased in during the effective period of the 2018 Seattle Energy Code, requiring buildings with over 50,000 square feet of *conditioned floor area* to periodically assess and optimize the functioning of energy-consuming systems. The cost and complexity of these tune-ups can potentially be minimized by careful configuration of the metering system.

C409.1.3 Dwelling units. See Sections C404.9 and C405.7 for additional metering requirements for Group R-2 *dwelling units.*

C409.2 Energy source metering. Buildings shall have a meter at each energy source. For each energy supply source listed in Section C409.2.1 through C409.2.4, meters shall collect data for the whole building or for each separately metered portion of the building where not exempted by the exceptions to Section C409.1.

Exceptions:

1. Energy source metering is not required where end use metering for an energy source accounts for all usage of that energy type within a building, and the *data acquisition system* accurately totals the energy delivered to the building or separately metered portion of the building.
2. Solid fuels such as coal, firewood or wood pellets that are delivered via mobile transportation do not require metering.

C409.2.1 Electrical energy. This category shall include all electrical energy supplied to the building and its associated site, including site lighting, parking, recreational facilities, and other areas that serve the building and its occupants.

Exception: Where site lighting and other exterior non-building electrical loads are served by an electrical service and meter that are separate from the building service and meter, the metering data from those loads is permitted to be either combined with the building's electrical service load data or delivered to a separate *data acquisition system.*

C409.2.2 Gas and liquid fuel supply energy. This category shall include all natural gas, fuel oil, propane and other gas or liquid fuel energy supplied to the building and site.

C409.2.3 District energy. This category shall include all net energy extracted from district steam systems, district chilled water loops, district hot water systems, or other energy sources serving multiple buildings.

C409.2.4 Site-generated renewable energy. This category shall include all net energy generated from on-site solar, wind, geothermal, tidal or other natural sources, and waste heat reclaimed from sewers or other off-site sources. For buildings exempt from data collection systems, the data from these meters is permitted to either be stored locally using a manual totalizing meter or other means at the meter or fed into a central data collection system.

C409.3 End-use metering. Meters shall be provided to collect energy use data for each end-use category listed in Sections C409.3.1 through C409.3.7. These meters shall collect data for the whole building or for each separately metered portion of the building where not exempted by the exception to Section C409.1. Not more than 10 percent of the total connected load of any of the end-use metering categories in Sections C409.3.1 through C409.3.6 is permitted to be excluded from that end-use data collection. Not more than 10 percent of the total connected load of any of the end-use metering categories in Sections C409.3.1 through C409.3.6 is permitted to consist of loads not part of that category. Multiple meters may be used for any end-use category, provided that the data acquisition system totals all of the energy used by that category. Full-floor tenant space submetering data shall be provided to the tenant in accordance with Section C409.7, and the data shall not be required to be included in other end-use categories.

Exceptions:

1. HVAC and service water heating equipment serving only an individual dwelling unit or sleeping unit does not require end-use metering.
2. Separate metering is not required for fire pumps, stairwell pressurization fans or other life safety systems that operate only during testing or emergency.
3. End use metering is not required for individual tenant spaces not exceeding 2,500 square feet in floor area when a dedicated source meter meeting the requirements of Section C409.4.1 is provided for the tenant space.
4. Healthcare facilities with loads in excess of 150 kVA are permitted to have submetering that measures electrical energy usage in accordance with the normal and essential electrical systems as identified in Section 517 of the Seattle Electrical Code except that submetering is required for the following load categories:
   4.1. HVAC system energy use in accordance with the requirements of Section C409.3.1.
   4.2. Service water heating energy use in accordance with the requirements of Section C409.3.2.
   4.3. Process load system energy in accordance with the requirements of Section ((~~C409.3.5~~)) C409.3.6 for each significant facility not used in direct patient care, including but not limited to, food service, laundry and sterile processing facilities, where the total connected load of the facility exceeds 100 kVA.
5. End-use metering is not required for electrical circuits serving only land guest suites within Group R-1 occupancies. This exception does not apply to common areas or to equipment serving multiple sleeping rooms.

C409.3.1 HVAC system energy use. This category shall include all energy including electrical, gas, liquid fuel, district steam and district chilled water that is used by boilers, chillers, pumps, fans and other equipment used to provide space heating, space cooling, dehumidification and ventilation to the building, but not including energy that serves process loads, service water heating or miscellaneous loads as defined in Section C409.3. Multiple HVAC energy sources, such as gas, electric and steam, are not required to be summed together.

Exceptions:

1. 120 volt equipment.
2. An HVAC branch circuit where the total MCA of equipment served equates to less than 10 kVA.
3. Individual fans or pumps that are not on a variable frequency drive.

C409.3.2 Service water heating energy use. This category shall include all energy used for heating of domestic and service hot water, but not energy used for space heating.

Exception: Service water heating energy use less than 50 kVA does not require end-use metering.

C409.3.3 Lighting system energy use. This category shall include all energy used by interior and exterior lighting, including lighting in parking structures and lots, but not including plug-in task lighting.

C409.3.4 Electric vehicle charging energy use. This category shall include all energy used for electrical vehicle charging. For buildings exempt from data collection systems, the data from these meters is permitted to either be stored locally using a manual totalizing meter or other means at the meter or fed into a central data collection system.

C409.3.5 Plug load system energy use. This category shall include all energy used by appliances, computers, plug-in task lighting, and other equipment or equipment covered by other end-use metering categories listed in Section C409.3. In a building where the main service is 480/277 volt, each 208/120 volt panel is permitted to be assumed to serve only plug load for the purpose of Section C409, unless it serves nonresidential refrigeration or cooking equipment.

Exception: Where the total connected load of all plug load circuits is less than 50 kVA end-use metering is not required.

C409.3.6 Process load system energy use. This category shall include all energy used by any non-building process load, including but not limited to nonresidential refrigeration and cooking equipment, laundry equipment, industrial equipment and stage lighting.

Exception: Where the process load energy use is less than 50 kVA, end-use metering is not required.

C409.3.7 Full-floor tenant space electrical submetering. In a multi-tenant building where more than 90 percent of the leasable area of a floor is occupied by a single tenant, an electrical energy use display shall be provided to the tenant in accordance with the requirements of Section C409.4.3. Electrical loads from areas outside of the tenant space or from equipment that serves areas outside of the tenant space shall not be included in the tenant space submetering. A single display is permitted to serve multiple floors occupied by the same tenant.

C409.4 Measurement devices, data acquisition system and energy display.

C409.4.1 Meters. Meters and other measurement devices required by this section shall have local displays or be configured to automatically communicate energy data to a data acquisition system. Source meters may be any digital-type meters. Current sensors or flow meters are allowed for end use metering, provided that they have an accuracy of +/- 5%. All required metering systems and equipment shall provide at least hourly data that is fully integrated into the data acquisition and display system per the requirements of Section C409.

C409.4.2 Data acquisition system. The data acquisition system shall store the data from the required meters and other sensing devices in a single database for a minimum of 36 months. For each energy supply and end use category required by C409.2 and C409.3, it shall provide real-time energy consumption data and logged data for any hour, day, month or year.

C409.4.3 Energy display. For each building subject to Section C409.2 and C409.3, either a visible display in a location with *ready access*, or a single web page or other electronic document available for access to building management or to a third-party energy data analysis service shall be provided in the building available for access to building operation and management personnel. The display shall graphically provide the current energy consumption rate for each whole building energy source, plus each end use category, as well as the total and ((~~peak~~)) maximum hourly consumption values for any day, week, month and year.

((~~The display shall graphically provide the current energy consumption rate for each whole building energy source, plus each end-use category, as well as the total and peak values for any day, week, month and year.~~)) The display shall be capable of and configured to graphically display the energy use data for any source or end use category or any combination of sources and end uses for any selected daily, weekly, monthly or annual time period, and to view the selected time period simultaneously with another selected time period or a reference benchmark time period. The display shall be capable of weather-normalizing data in the comparison time periods, and facilitate display of energy use trends and identification of anomalies.

C409.4.4 Commissioning. Energy metering and energy consumption management systems shall be commissioned in accordance with Section ((~~C408~~)) C408.6.

((~~**C409.5 Metering for existing buildings.**~~

~~**C409.5.1 Existing buildings that were constructed subject to the requirements of this section.** Where new or replacement systems or equipment are installed in an existing building that was constructed subject to the requirements of this section, metering shall be provided for such new or replacement systems or equipment so that their energy use is included in the corresponding end-use category defined in Section C409.3. This includes systems or equipment added in conjunction with additions or alterations to existing buildings.~~

~~**C409.5.1.1 Small existing buildings.** Metering and data acquisition systems shall be provided for additions over 25,000 square feet to buildings that were constructed subject to the requirements of this section, in accordance with the requirements of Sections C409.2 and C409.3.~~))

SDCI Informative Note: Section C409.5 regarding metering for existing buildings is relocated to Section 506.1.

SECTION C410
REFRIGERATION SYSTEM REQUIREMENTS **

C410.1 General. Walk-in coolers, walk-in freezers, refrigerated warehouse coolers, refrigerated warehouse freezers, and refrigerated display cases shall comply with this Section.

Refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with Section C402. Section C402.1.5, Component performance alternative, may be used if granted prior approval by the jurisdiction.

C410.1.1 Refrigeration equipment performance. Refrigeration equipment shall have an energy use in kWh/day not greater than the values of Tables C410.1.1(1) and C410.1.1(2) when tested and rated in accordance with AHRI Standard 1200. The energy use shall be verified through certification under an approved certification program or, where a certification program does not exist, the energy use shall be supported by data furnished by the equipment manufacturer.

TABLE C410.1.1(1)
MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL REFRIGERATION

EQUIPMENT TYPE	APPLICATION	ENERGY USE LIMITS (kWh per day)[a]	TEST PROCEDURE
Refrigerator with solid doors	Holding Temperature	0.10 × V + 2.04	AHRI 1200
Refrigerator with transparent doors		0.12 × V + 3.34	
Freezers with solid doors		0.40 × V + 1.38	
Freezers with transparent doors		0.75 × V + 4.10	
Refrigerator/freezers with solid doors		The greater of 0.12 × V + 3.34 or 0.70	
Commercial refrigerators	Pulldown	0.126 × V + 3.51	

a. V = Volume of the chiller for frozen compartment as defined in AHAM-HRF-1.

VCS = Vertical solid doors
HCT = Horizontal transparent doors
HCS = Horizontal solid doors
SOC = Service over counter

(BB) An operating mode code:
RC = Remote condensing
SC = Self-contained

(C) A rating temperature code:
M = Medium temperature (38°F)
L = Low temperature (0°F)
I = Ice cream temperature (15°F)

For example, "VOP.RC.M" refers to the "vertical-open, remote-condensing, medium-temperature" equipment class.

C410.2 Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers. *Refrigerated warehouse coolers, refrigerated warehouse freezers,* and all *walk-in coolers* and *walk-in freezers* including site assembled, site constructed and prefabricated units shall comply with the following. ((÷)) Where they comprise any portion of the thermal envelope of the building, they shall comply with the requirements of Section C402, using the *R*-values or *U*-values listed in this Section C410.2. Section C402.1.5 component performance alternative is permitted to be used where *approved* by the *code official.*

1. *Automatic* door-closers shall be provided that fully close walk-in doors that have been closed to within 1 inch (25 mm) of full closure.

   Exception: *Automatic* closers are not required for doors more than 45 inches (1143 mm) in width or more than 7 feet (2134 mm) in height.

2. Doorways shall be provided with strip doors, curtains, spring-hinged doors or other method of minimizing infiltration when doors are open.
3. *Walk-in coolers* and *refrigerated warehouse coolers* shall be provided with wall, ceiling, and door insulation of not less than R-25 or have wall, ceiling and door assembly *U*-factors no greater than *U*-0.039. *Walk-in freezers* and *refrigerated warehouse freezers* shall be provided with wall, ceiling and door insulation of not less than R-32 or have wall, ceiling and door assembly *U*-factors no greater than *U*-0.030.

   Exception: Insulation is not required for glazed portions of doors or at structural members associated with the walls, ceiling or door frame.

4. The floor of *walk-in coolers* shall be provided with floor insulation of not less than R-25 or have a floor assembly *U*-factor no greater than *U*-0.040. The floor of *walk-in freezers* shall be provided with floor insulation of not less than R-28 or have a floor assembly *U*-factor no greater than *U*-0.035.

   Exception: Insulation is not required in the floor of a *walk-in cooler* that is mounted directly on a slab on grade.

5. Transparent fixed windows and reach-in doors for *walk-in freezers* and windows in *walk-in freezer* doors shall be provided with triple-pane glass, with the interstitial spaces filled with inert gas, or be provided with heat-reflective treated glass.
6. Transparent fixed windows and reach-in doors for *walk-in coolers* and windows for *walk-in cooler* doors shall be provided with double-pane or triple-pane glass, with interstitial spaces filled with inert gas, or be provided with heat-reflective treated glass.
7. Evaporator fan motors that are less than 1 hp (0.746 kW) and less than 460 volts shall be provided with electronically commutated motors, brushless direct-current motors, or 3-phase motors.
8. Condenser fan motors that are less than 1 hp (0.746 kW) shall use electronically commutated motors, permanent split capacitor-type motors or 3-phase motors.
9. Antisweat heaters that are not provided with antisweat heater controls shall have a total door rail, glass and frame heater power draw of not greater than 7.1 W/ft^2 (76 W/m^2) of door opening for *walk-in freezers* and not greater than 3.0 W/ft^2 (32 W/m^2) of door opening for *walk-in coolers.*
10. Where antisweat heater controls are provided, they shall be capable of reducing the energy use of the antisweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.
11. Lights in *walk-in coolers, walk-in freezers, refrigerated warehouse coolers* and *refrigerated warehouse freezers* shall either be provided with light sources with an efficacy of not less than 40 lumens per watt, including ballast losses, or shall be provided with a device that turns off the lights within 15 minutes of when the *walk-in cooler* or *walk-in freezer* space is not occupied.
12. Evaporator fans in refrigerated warehouses shall be variable speed, and the speed shall be controlled in response to space conditions.

Exception: Evaporators served by a single compressor without unloading capability.

C410.2.1 Performance standards. Site-assembled and site-constructed walk-in coolers and walk-in freezers shall meet the requirements of Tables C410.2.1.1(1), C410.2.1.1(2) and C410.2.1.1(3).

TABLE C410.2.1.1(1)
WALK-IN COOLER AND FREEZER DISPLAY DOORS EFFICIENCY REQUIREMENTS

Class Description	Class	Maximum Energy Consumption (kWh/day)[a]
Display Door, Medium Temperature	DD, M	$0.04 \times A_{dd} + 0.41$
Display Door, Low Temperature	DD, L	$0.15 \times A_{dd} + 0.29$

a. A_{dd} is the surface area of the display door

TABLE C410.2.1.1(2)
WALK-IN COOLER AND FREEZER NON-DISPLAY DOORS EFFICIENCY REQUIREMENTS

Class Description	Class	Maximum Energy Consumption (kWh/day)[a]
Passage Door, Medium Temperature	PD, M	$0.05 \times A_{nd} + 1.7$
Passage Door, Low Temperature	PD, L	$0.14 \times A_{nd} + 4.8$
Freight Door, Medium Temperature	FD, M	$0.04 \times A_{nd} + 1.9$
Freight Door, Low Temperature	FD, L	$0.12 \times A_{nd} + 5.6$

a. A_{nd} is the surface area of the display door

TABLE C410.2.1.1(3)
WALK-IN COOLER AND FREEZER REFRIGERATION SYSTEMS EFFICIENCY REQUIREMENTS

Class Description	Class	Minimum Annual Walk-in Energy Factor AWEF (Btu/hW-h)
Dedicated Condensing, Medium Temperature, Indoor System	DC.M.I	5.61
Dedicated Condensing, Medium Temperature, Indoor System, > 9,000 Btu/h Capacity	DC.M.I, > 9,000	5.61
Dedicated Condensing, Medium Temperature, Outdoor System	DC.MI	7.60
Dedicated Condensing, Medium Temperature, Outdoor System, > 9,000 Btu/h Capacity	DC.M.I, > 9,000	7.60

C410.2.2 Refrigerated display cases. Site-assembled or site-constructed refrigerated display cases shall comply with the following:

1. Lighting and glass doors in refrigerated display cases shall be controlled by one of the following:
   1.1. Time switch controls to turn off lights during nonbusiness hours. Timed overrides for display cases shall turn the lights on for up to 1 hour and shall automatically time out to turn the lights off.
   1.2. Motion sensor controls on each display case section that reduce lighting power by at least 50 percent within 3 minutes after the area within the sensor range is vacated.
2. Low-temperature display cases shall incorporate temperature-based defrost termination control with a time-limit default. The defrost cycle shall terminate first on an upper temperature limit breach and second upon a time limit breach.
3. Antisweat heater controls shall reduce the energy use of the antisweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.

C410.3 Refrigeration systems. Refrigerated display cases, *walk-in coolers* or *walk-in freezers* that are served by remote compressors and remote condensers not located in a *condensing unit*, shall comply with Sections C410.3.1, C410.3.2, and C403.9.2.3.

Exception: Systems where the working fluid in the refrigeration cycle goes through both subcritical and supercritical states (transcritical) or that use ammonia refrigerant are exempt.

C410.3.1 Condensers serving refrigeration systems. Fan-powered condensers shall comply with the following:

1. The design *saturated condensing temperatures* for air-cooled condensers shall not exceed the design dry-bulb temperature plus 10°F (5.6°C) for *low-temperature refrigeration systems*, and the design dry-bulb temperature plus 15°F (8°C) for *medium temperature refrigeration systems* where the *saturated condensing temperature* for blend refrigerants shall be determined using the average of liquid and vapor temperatures as converted from the condenser drain pressure.
2. Condenser fan motors that are less than 1 hp (0.75 kW) shall use electronically commutated motors, permanent split-capacitor-type motors or 3-phase motors.

3. Condenser fans for air-cooled condensers, evaporatively cooled condensers, air- or water-cooled fluid coolers or cooling towers shall reduce fan motor demand to not more than 30 percent of design wattage at 50 percent of design air volume, and incorporate one of the following continuous variable speed fan control approaches:
   3.1. Refrigeration system condenser control for air-cooled condensers shall use variable set point control logic to reset the condensing temperature set point in response to ambient dry-bulb temperature.
   3.2. Refrigeration system condenser control for evaporatively cooled condensers shall use variable set point control logic to reset the condensing temperature set point in response to ambient wet-bulb temperature.
4. Multiple fan condensers shall be controlled in unison.
5. The minimum condensing temperature set point shall be not greater than 70°F (21°C).

C410.3.2 Compressor systems. Refrigeration compressor systems shall comply with the following:

1. Compressors and multiple-compressor system suction groups shall include control systems that use floating suction pressure control logic to reset the target suction pressure temperature based on the temperature requirements of the attached refrigeration display cases or walk-ins.

   Exception: Controls are not required for the following:

   1. Single-compressor systems that do not have variable capacity capability.
   2. Suction groups that have a design saturated suction temperature of 30°F (-1.1°C) or higher, suction groups that comprise the high stage of a two-stage or cascade system, or suction groups that primarily serve chillers for secondary cooling fluids.
2. Liquid subcooling shall be provided for all low-temperature compressor systems with a design cooling capacity equal to or greater than 100,000 Btu/hr (29.3 kW) with a design-saturated suction temperature of -10°F (-23°C) or lower. The subcooled liquid temperature shall be controlled at a maximum temperature set point of 50°F (10°C) at the exit of the subcooler using either compressor economizer (interstage) ports or a separate compressor suction group operating at a saturated suction temperature of 18°F (-7.8°C) or higher.
   2.1. Insulation for liquid lines with a fluid operating temperature less than 60°F (15.6°C) shall comply with Table ((~~C403.2.10~~)) C403.10.3.
3. Compressors that incorporate internal or external crankcase heaters shall provide a means to cycle the heaters off during compressor operation.
4. Compressor systems utilized in refrigerated warehouses shall conform to the following:
   4.1. Compressors shall be designed to operate at a minimum condensing temperature of 70°F or less.
   4.2. The compressor speed of a screw compressor greater than 50 hp shall be controllable in response to the refrigeration load or the input power to the compressor shall be controlled to use no more than 60 percent of full load input power when operated at 50 percent of full refrigeration capacity.

   Exception: Refrigeration plants with more than one dedicated compressor per suction group.

C410.4 Commissioning. Refrigeration systems shall be commissioned in accordance with Section C408.

Exception: Self-contained units.

SECTION C411
SOLAR READINESS

C411.1 General. ((~~A~~)) In addition to the requirements of Section C412, a *solar zone* shall be provided on ((~~non-residential~~)) buildings that are 20 stories or less in height above grade plane. The *solar zone* shall be located on the roof of the building or on another structure elsewhere on the site. The *solar zone* shall be in accordance with Sections C411.2 through C411.8 and the *International Fire Code.*

Exception. A *solar zone* is not required where the solar exposure of the building's roof area is less than 75 percent of that of an unshaded area, as defined in Section C411.5, in the same location, as measured by one of the following:

1. Incident solar radiation expressed in kWh/ft^2-yr using typical meteorological year (TMY) data;
2. Annual sunlight exposure expressed in cumulative hours per year using TMY data;
3. Shadow studies indicating that the roof area is more than 25 percent in shadow, on September 21 at 10am, 11am, 12pm, 1pm, and 2pm solar time.

C411.2 Minimum area. The minimum area of the *solar zone* shall be determined by one of the following methods, whichever results in the smaller area:

1. 40 percent of roof area. The roof area shall be calculated as the horizontally-projected gross roof area less the area covered by skylights, occupied roof decks, mechanical equipment, and planted areas.
2. 20 percent of electrical service size. The electrical service size is the rated capacity of the total of all electrical services to the building, and the required solar zone size shall be based upon 10 peak watts of photovoltaic per square foot.

   Exception. Subject to the approval of the *code official*, buildings with extensive rooftop equipment that would make full compliance with this section impractical shall be permitted to reduce the size of the solar zone required by Section C411.2 to the maximum practicable area.

Example: A building with a 10,000 SF total roof area, 1,000 SF skylight area, and a 400 Amp, 240-volt single phase electrical service is required to provide a solar zone area of the smaller of the following:

1. [40% x (10,000 SF roof area – 1,000 SF skylights)] = 3,600 SF; or
2. [400 Amp x 240 Volts x 20% / 10 watts per SF] = 1,920 SF

Therefore, a *solar zone* of 1,920 square feet is required.

C411.3 Contiguous area. The *solar zone* is permitted to be comprised of separated sub-zones. Each sub-zone shall be at least 5 feet wide in the narrowest dimension.

C411.4 Obstructions. The *solar zone* shall be free of pipes, vents, ducts, HVAC equipment, skylights and other obstructions, except those serving photovoltaic systems within the *solar zone*. The *solar zone* is permitted to be located above any such obstructions, provided that the racking for support of the future system is installed at the time of construction, the elevated *solar zone* does not shade other portions of the solar zone, and its height is permitted by the *International Building Code* and the Seattle Land Use Code. Photovoltaic or solar water heating systems are permitted to be installed within the solar zone.

C411.5 Shading. The *solar zone* shall be set back from any existing or new object on the building or site that is located south, east, or west of the *solar zone* a distance at least two times the object's height above the nearest point on the roof surface. Such objects include but are not limited to taller portions of the building itself, parapets, chimneys, antennas, signage, rooftop equipment, trees and roof plantings. No portion of the *solar zone* shall be located on a roof slope greater than 2:12 that faces within 45 degrees of true north.

C411.6 Access. Areas contiguous to the *solar zone* shall provide access pathways and provisions for emergency smoke ventilation as required by the *International Fire Code*.

C411.7 Structural integrity. The as-designed dead load and live load for the *solar zone* shall be clearly marked on the record drawings and shall accommodate future photovoltaic system arrays at an assumed dead load of 4 pounds per square foot in addition to other required live and dead loads. A location for future inverters shall be designated either within or adjacent to the *solar zone*, with a minimum area of 2 square feet for each 1000 square feet of *solar zone* area, and shall accommodate an assumed dead load of 175 pounds per square foot. Where photovoltaic systems are installed in the *solar zone*, structural analysis shall be based upon calculated loads, not upon these assumed loads.

C411.8 Photovoltaic interconnection. A minimum 2-inch diameter roof penetration conduit shall be provided, with threaded caps above and below the roof deck and minimum R-10 insulation wrapping the lower portion, within each 2,500-square-foot section of the required *solar zone* area. Interconnection of the future photovoltaic system shall be provided for at the main service panel, either ahead of the service disconnecting means or at the end of the bus opposite the service disconnecting means, in one of the following forms:

1. A space for the mounting of a future overcurrent device, sized to accommodate the largest standard rated overcurrent device that is less than 20 percent of the bus rating.
2. Lugs sized to accommodate conductors with an ampacity of at least 20 percent of the bus rating, to enable the mounting of an external overcurrent device for interconnection.

The electrical construction documents shall indicate the following:

1. Solar zone boundaries and access pathways;
2. Location for future inverters and metering equipment; and
3. Route for future wiring between the photovoltaic panels and the inverter, and between the inverter and the main service panel.

SECTION C412
RENEWABLE ENERGY

C412.1 On-site renewable energy systems. Each new building or *addition* larger than 5,000 square feet of gross conditioned floor area shall include a renewable energy generation system consisting of not less than 0.25 watts rated peak photovoltaic energy production per square foot of *conditioned space*.

Exceptions:

1. Increased additional energy credits. Where 3.0 additional energy credits from Table C406.1 are provided in addition to those required by other sections of this code, the on-site renewable energy generation system is not required.
   - 1.1. Where 1.0 additional energy credits from Table C406.1 is provided in addition to those required by other sections of this code, the size of the on-site renewable energy generation system is permitted to be reduced by 1/3.
   - 1.2. Where 2.0 additional energy credits from Table C406.1 are provided in addition to those required by other sections of this code, the size of the on-site renewable energy generation system is permitted to be reduced by 2/3.
   - 1.3. Where approved by SDCI, interpolation between exceptions 1, 1.1, and 1.2 is permitted.
2. Reduced Building Performance Factor. For projects utilizing the Section C407 Total Building Performance compliance path, the on-site renewable energy generation system is not required where the building performance factor (BPF) is not less than 3 percent lower than the maximum BPF permitted cumulatively by all other sections of this code.

Example: To use this exception, a building with a required BPF of 50 would be required to provide a BPF of (50 x 0.97 =) 48.5 instead.

   - 2.1. Where the BPF is not less than 1 percent lower than the BPF required cumulatively by other sections of this code, the size of the on-site renewable energy generation system is permitted to be reduced by 1/3.
   - 2.1. Where the BPF is not less than 2 percent lower than the BPF required cumulatively by other sections of this code, the size of the on-site renewable energy generation system is permitted to be reduced by 2/3.
3. Transfer to an *affordable housing* project. Where *approved* by SDCI, all or part of the required on-site renewable energy generation system is permitted to be replaced by construction of a system that is 50 percent of the required system size when located on an existing *affordable housing* project within the city of Seattle, or 75 percent of the required system size when located on a new construction *affordable housing* project within the city of Seattle. Documentation demonstrating that the renewable energy generation system has been installed on the *affordable housing* project site, the system is fully operational, and ownership has been transferred to the owner of the *affordable housing* project, must be submitted prior to issuance of the certificate of occupancy.

SDCI Informative Note: Option 3 will only be available if an affordable housing project is available to accept the renewable energy system. There is no assurance that such a project location will be available. It is the owner's responsibility to locate and coordinate with the affordable housing project, and to ensure that the installation is completed in a timely manner.

4. Transfer to a Washington State agency program. Where *approved* by SDCI, all or part of the required renewable energy generation system is permitted to be replaced by a contribution of $2.50 for each required watt of installed capacity, to a solar energy fund managed by a Washington state agency that will provide solar energy installations for *affordable housing* projects. Documentation demonstrating that the contribution has been received by the state agency must be submitted prior to issuance of the certificate of occupancy.

SDCI Informative Note: Option 4 will only be available if a solar energy fund for affordable housing is created by the Housing Trust Fund, Washington State Housing Finance Commission, or another state agency program for which the project is qualified to participate. There is no assurance that such a program will be available.

5. *Affordable housing*. The on-site renewable energy generation system is not required for *affordable housing* projects.

CHAPTER 5 [CE]

EXISTING BUILDINGS

SECTION C501
GENERAL

C501.1 Scope. The provisions of this chapter shall control the *alteration, repair, addition* and change of occupancy of existing buildings and structures.

C501.2 Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

C501.3 Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices and systems which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's authorized agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

C501.4 Compliance. *Alterations, repairs, additions* and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions for *alterations, repairs, additions* and changes of occupancy or relocation, respectively, in this code and in the *International Building Code, International Existing Building Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, Uniform Plumbing Code,* and ((~~NFPA 70~~)) Seattle Electrical Code.

C501.4.1 U-factor requirements for retrofits. For existing building projects where an *addition* or *building envelope retrofit* area is combined with existing-to-remain building areas to demonstrate compliance with this code as a whole building, the U-factors applied to existing-to-remain envelope assemblies shall be in accordance with record documents.

Exception: If accurate record documents are not available, U-factors for the existing envelope assemblies may be in accordance with the edition of the Washington State Energy Code that was in effect at the time the building was permitted, or as approved by the *code official.*

C501.4.2 Calculation of mechanical heating and cooling loads for retrofits. For the installation of new or replacement mechanical equipment that serves existing building areas, design loads associated with heating, cooling and ventilation of the existing building areas served shall be determined in accordance with Section C403.1.2.

R-values and U-factors used to determine existing thermal envelope performance for the purpose of calculating design loads shall be in accordance with record documents or existing conditions.

Exception: If accurate record documents are not available, R-values and U-factors used to determine existing building thermal envelope performance may be in accordance with the edition of the Washington State Energy Code that was in effect at the time the building was permitted, or as approved by the *code official.*

C501.5 New and replacement materials. Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for *repairs,* provided no hazard to life, health or property is created. Hazardous materials shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.

C501.6 ((~~Historic buildings~~)) Landmarks. The ((~~building official~~)) *code official* may modify the specific requirements of this code for ((~~historic buildings~~)) *landmarks* and require in lieu thereof alternate provisions ((~~which~~)) that the *code official* determines will not have an adverse effect on the designated historic features of the building and will result in a reasonable degree of energy efficiency. ((~~This modification may be allowed for those buildings or structures that are listed in the state or national register of historic places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a national register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the national or state registers of historic places either individually or as a contributing building to a historic district by the state historic preservation officer or the keeper of the national register of historic places.~~))

C501.7 Commissioning. Existing building systems shall be commissioned in accordance with Section C408. For the purposes of meeting the commissioning thresholds in Section C408.1, only the new and altered system capacities are considered when determining whether the project is exempt from some portion of the commissioning process.

SECTION C502
ADDITIONS

C502.1 General. *Additions* to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion of the existing building or building system to

comply with this code. *Additions* shall not create an unsafe or hazardous condition or overload existing building systems. An *addition* shall be deemed to comply with this code if the *addition* alone complies or if the existing building and *addition* comply with this code as a single building. *Additions* using the prescriptive path in Section C401.2, item 1, shall also comply with Sections C402, C403, C404, C405, C406, C409.5, C410 and C502.2.

C502.1.1 Additional efficiency package options. *Additions* shall comply with Section C406, either for the *addition* only or for the total of the existing building plus *addition.*

Exception: *Additions* smaller than 500 square feet of *conditioned floor area* are not required to comply with Section C406.

C502.2 Prescriptive compliance. *Additions* shall comply with Sections C502.2.1 through C502.2.6.2.

C502.2.1 Vertical fenestration. *Additions* with *vertical fenestration* that results in a total building vertical fenestration area less than or equal to that specified in Section C402.4.1 shall comply with Section C402.4. *Additions* with *vertical fenestration* that results in a total building *vertical fenestration area* greater than that specified in Section C402.4.1 shall comply with one of the following:

1. Component performance alternative with target area adjustment per Section C402.1.5 for the *addition* area of the building only.
2. Existing building and *addition* area are combined to demonstrate compliance with the component performance alternative for the whole building.
3. Total building performance in accordance with Section C407 for the *addition* area of the building only.
4. Total building performance for the whole building.

C502.2.2 Skylight area. *Additions* with *skylights* that result in a total building skylight area less than or equal to that specified in Section C402.4.1 shall comply with Section ((~~C402.4~~)) C402. *Additions* with skylights that result in a total building skylight area greater than that specified in Section C402.4.1 shall comply with one of the following:

((~~1. Vertical fenestration alternate per Section C402.4.1.1 or C402.4.1.3 for the addition area of the building only~~

~~2~~)) 1. Component performance alternative with the target area adjustment per Section C402.1.5 for the *addition* area of the building only.

((~~3~~)) 2. Existing building and *addition* area combined to demonstrate compliance with the component performance alternative for the whole building.

((~~4~~)) 3. Total building performance in accordance with Section C407 for the *addition* area of the building only.

((~~5~~)) 4. Total building performance for the whole building.

C502.2.3 Building mechanical systems. New mechanical systems and equipment serving the building heating, cooling or ventilation needs, that are part of the *addition*, shall comply with Section C403.

C502.2.4 Service water heating systems. New service water-heating equipment, controls and service water heating piping shall comply with Section C404.

C502.2.5 Pools and permanent spas. New pools and permanent spas shall comply with Section C404.11.

C502.2.6 Lighting and power systems. New lighting systems that are installed as part of the addition shall comply with Section C405.

C502.2.6.1 Interior lighting power. The total interior lighting power for the addition shall comply with Section C405.4.2 for the addition alone, or the existing building and the addition shall comply as a single building.

C502.2.6.2 Exterior lighting power. The total exterior lighting power for the addition shall comply with Section ((~~C405.5.1~~)) C405.5.2 for the *addition* alone, or the existing building and the addition shall comply as a single building.

C502.2.7 Refrigeration systems. New refrigerated spaces and refrigeration equipment shall comply with Section C410.

SECTION C503
ALTERATIONS

C503.1 General. *Alterations* to any building or structure shall comply with the requirements of Section C503 and the code for new construction. *Alterations* to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. *Alterations* shall be such that the existing building or structure is no less conforming to the provisions of this code than the existing building or structure was prior to the *alteration.* Substantial alterations and *repairs* shall comply with Section C503.8.

Exceptions:

1. The following *alterations* need not comply with the requirements for new construction provided the energy use of the building is not increased:

((~~1~~)) a. Storm windows installed over existing fenestration.

((~~2~~)) b. Surface applied window film installed on existing single pane fenestration assemblies to reduce solar heat gain provided the code does not require the glazing fenestration to be replaced.

((~~3~~)) c. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are insulated to full depth with insulation having a minimum nominal value of R-3.0 per inch installed per Section C402.

((~~4~~)) d. Construction where the existing roof, wall or floor cavity is not exposed.

((~~5~~)) e. *Roof recover.*

((~~6~~)) f. *Air barriers* shall not be required for roof recover and roof replacement where the alterations or renovations to the building do not include alterations, renovations or repairs to the remainder of the building envelope.

((~~7~~)) g. Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided however that an existing vestibule that separates a conditioned space from the exterior shall not be removed.

2. *Alterations* are not required to comply with Section C406 except where specifically noted in Sections C503.2, C503.8.3 and C505.1.

C503.2 Change in space conditioning. Any low energy space in accordance with Section C402.1.1.1 that is altered to become *conditioned space* or *semi-heated* space shall be brought into full compliance with this code. Any *semi-heated* space in accordance with Section C402.1.1.2 that is altered to become *conditioned space*, or any heated but not cooled space that is altered to become both heated and cooled, shall be brought into full compliance with this code. Compliance shall include the provisions of Section C406, applied only to the portion of the building undergoing a change in space conditioning.

For buildings with more than one space conditioning category, the interior partition walls, ceilings, floors and fenestration that separate space conditioning areas shall comply with the thermal envelope requirements per the area with the highest level of space conditioning.

A change in space conditioning project shall be deemed to comply with this code if the project area alone complies or if the existing building and the project area combined comply with this code as a whole building.

Exception: Buildings or spaces that were permitted prior to the 2009 WSEC, or were originally permitted as unconditioned, may comply with this section as follows:

1. Where the component performance alternative in Section C402.1.5 is used to demonstrate compliance with this section, the Proposed Total UA is allowed to be up to 110 percent of the Allowable Total UA. This exception may be applied to the project area alone, or to the existing building and project area combined as a whole building.
2. Where total building performance in Section C407 is used to demonstrate compliance with this section, the total annual carbon emissions from energy consumption of the proposed design is allowed to be up to 110 percent of the annual carbon emissions from energy consumption allowed by Section C407.3. This exception may be applied to the project area alone, or to the existing building and project area combined as a whole building.
3. The addition of cooling equipment serving rooms or spaces totaling less than 2,000 square feet in floor area does not trigger the requirement to comply with this section.

C503.3 Building envelope. New building envelope assemblies that are part of the *alteration* shall comply with Sections C402.1 through C402.5 as applicable. Where an opaque envelope assembly is altered or replaced, the new assembly shall in no case have a higher overall *U*-value than the existing.

Exception: Air leakage testing is not required for *alterations* and repairs, unless the project includes a change in space conditioning according to Section C503.2 or a *change of occupancy* or use according to Section C505.1.

C503.3.1 Roof replacement. *Roof replacements* shall comply with Table C402.1.3 or C402.1.4 where the existing roof assembly is part of the *building thermal envelope* and contains no insulation or contains insulation entirely above the roof deck.

C503.3.2 Vertical fenestration. The addition of *vertical fenestration* that results in a total building vertical fenestration area less than or equal to that specified in Section C402.4.1 shall comply with Section C402.4. Alterations that result in a total building vertical fenestration area greater than specified in Section C402.4.1 shall comply with one of the following:

1. Vertical fenestration alternate in accordance with Section C402.4.1.3 for the new vertical fenestration added, where the calculation of vertical fenestration area and gross *above-grade wall* area shall include either the entire building or, where *approved*, only those areas of the building involved in the *alteration*.
2. ((~~Vertical fenestration alternate in accordance with Section C402.4.1.1 for the area adjacent to the new vertical fenestration added.~~)) (Reserved)
3. Existing building and ((~~alternation~~)) *alteration* area are combined to demonstrate compliance with the component performance alternative with target area adjustment in accordance with Section C402.1.5 for the whole building. The Proposed Total UA is allowed to be up to 110 percent of the Allowed Total UA.

4. Total building performance in accordance with Section C407 for the whole building. The total annual carbon emissions from energy consumption of the proposed design is allowed to be up to 110 percent of the annual carbon emissions from energy consumption allowed in accordance with Section C407.3.

Exception: ((~~Additional~~)) Where *approved* by the *code official*, additional fenestration is permitted where sufficient envelope upgrades beyond those required by other sections of this code are included in the project so that the addition of vertical fenestration does not cause ((~~a reduction in overall building energy efficiency, as approved by the *code official*~~)) an increase in the overall energy use of the building.

C503.3.2.1 Application to replacement fenestration products. Where some or all of an existing *fenestration* unit is replaced with a new *fenestration product*, including sash and glazing, the replacement *fenestration* unit shall meet the applicable requirements for *U*-factor and *SHGC* in Table C402.4. In addition, the area-weighted *U*-value of the new fenestration shall be equal to or lower than the *U*-value of the existing fenestration.

Exception: An area-weighted average of the *U*-factor of replacement fenestration products being installed in the building for each fenestration product category listed in Table C402.4 shall be permitted to satisfy the *U*-factor requirements for each fenestration product category listed in Table C402.4. Individual fenestration products from different product categories listed in Table C402.4 shall not be combined in calculating the area-weighted average *U*-factor.

C503.3.3 Skylight area. The addition of *skylights* that results in a total building skylight area less than or equal to that specified in Section C402.4.1 shall comply with Section C402.4.

The addition of *skylights* that results in a total building skylight area greater than that specified in Section C402.4.1 shall comply with one of the following:

1. Existing building and alteration area are combined to demonstrate compliance with the component performance alternative with target area adjustment in accordance with Section C402.1.5 for the whole building. The Proposed Total UA is allowed to be up to 110 percent of the Allowed Total UA.
2. Total building performance in accordance with Section C407 for the whole building. The total annual carbon emissions from energy consumption of the proposed design is allowed to be up to 110 percent of the annual carbon emissions from energy consumption allowed in accordance with Section C407.3.

Exception: Additional envelope upgrades are included in the project so the addition of skylights does not cause a reduction in overall building energy efficiency, as approved by the *code official*.

C503.4 Mechanical systems. Those parts of systems which are altered or replaced shall comply with Section C403. Additions or alterations shall not be made to an existing mechanical system that will cause the existing mechanical system to become out of compliance.

Exceptions:

1. Existing mechanical systems which are altered or where parts of the system are replaced are not required to be modified to comply with Section C403.3.5 as long as mechanical cooling capacity is not added to a system that did not have cooling capacity prior to the alteration.
2. Alternate mechanical system designs that are not in full compliance with this code may be approved when the *code official* determines that existing building constraints including, but not limited to, available mechanical space, limitations of the existing structure, or proximity to adjacent air intakes or exhausts make full compliance impractical. Alternate designs shall include additional energy saving strategies not prescriptively required by this code for the scope of the project including, but not limited to, demand control ventilation, energy recovery, or increased mechanical cooling or heating equipment efficiency above that required by Tables C403.3.2(1) through ((~~C403.3.2(12)~~)) C403.3.2(13).
3. Only those components of existing HVAC systems that are altered or replaced shall be required to meet the requirements of Section C403.8.1, Allowable fan motor horsepower. Components replaced or altered shall not exceed the fan power limitation pressure drop adjustment values in Table C403.8.1(2) at design conditions. Section C403.8.1 does not require the removal and replacement of existing system ductwork.

C503.4.1 New mechanical systems. All new mechanical systems in existing buildings, including packaged unitary equipment and packaged split systems, shall comply with Section C403.

C503.4.2 Addition of cooling capacity. Where mechanical cooling is added to a space that was not previously cooled, the mechanical system shall comply with either Section C403.3.5 or C403.5.

Exceptions:

1. Qualifying small equipment: Economizers are not required for cooling units and split systems serving one *zone* with a total cooling capacity rated in accordance with Section C403.3.2 of less than 33,000 Btu/h (hereafter referred to as qualifying small systems) provided that these are high-efficiency cooling equipment with SEER and EER values more than 15 percent higher than minimum efficiencies listed in Tables C403.3.2 (1) through (3), in the appropriate size category, using the same test procedures. Equipment shall be listed in the appropriate certification program to qualify for this exception. The total capacity of all qualifying small equipment without economizers shall not exceed 72,000 Btu/h per building, or 5 percent of the building total air economizer capacity, whichever is greater.

Notes and exclusions for Exception 1:

1.1. The portion of the equipment serving Group R occupancies is not included in determining the total capacity of all units without economizers in a building.

1.2. Redundant units are not counted in the capacity limitations.

1.3. This exception shall not be used for the initial tenant improvement of a shell-and-core building or space, or for total building performance.in accordance with Section C407.

1.4. This exception shall not be used for unitary cooling equipment installed outdoors or in a mechanical room adjacent to the outdoors.

2. Chilled water terminal units connected to systems with chilled water generation equipment with IPLV values more than 25 percent higher than minimum part load equipment efficiencies listed in Table C403.3.2(7), in the appropriate size category, using the same test procedures. Equipment shall be listed in the appropriate certification program to qualify for this exception. The total capacity of all systems without economizers shall not exceed ((~~480,000~~)) 72,000 Btu/h (141 kW) per building, or 20 percent of the building total air economizer capacity, whichever is greater.

Notes and exclusions for Exception ((~~1~~)) 2:

2.1. The portion of the equipment serving Group R occupancy is not included in determining the total capacity of all units without economizers in a building.

2.2. This exception shall not be used for the initial tenant improvement of a shell-and-core building or space, or for total building performance in accordance with Section C407.

C503.4.3 Alterations or replacement of existing cooling systems. Alterations to, or replacement of, existing mechanical cooling systems shall not decrease the building total economizer capacity unless the system complies with either Section C403.3.5 or C403.5. System alterations or replacement shall comply with Table C503.4 when either the individual cooling unit capacity ((~~and~~)) or the building total capacity of all cooling equipment without economizer ((~~do~~)) does not comply with Sections C403.3.5 or C403.5.

TABLE C503.4
ECONOMIZER COMPLIANCE OPTIONS FOR MECHANICAL ALTERATIONS

Unit Type	Option A Any alteration with new or replacement equipment	Option B (alternate to A) Replacement unit of the same type with the same or smaller output capacity	Option C (alternate to A) Replacement unit of the same type with a larger output capacity	Option D (alternate to A) New equipment added to existing system or replacement unit of a different type
1. Packaged Units	Efficiency: min.[a] Economizer: C403.5[b]	Efficiency: min.[a] Economizer: C403.5[b]	Efficiency: min.[a] Economizer: CC403.5[b]	Efficiency: min.[a] Economizer: C403.5[b]
2. Split Systems	Efficiency: min.[a] Economizer: C403.5[b]	For units ≤ 60,000 Btuh, comply with two of two measures: 1. Efficiency: + 10%[e] 2. Economizer: shall not decrease existing economizer capability For all other capacities: Efficiency: min.[a] Economizer: C403.5[b]	For units ≤ 60,000 Btuh replacing unit installed prior to 1991, comply with at least one of two measures: 1. Efficiency: + 10%[e] 2. Economizer: 50%[f] For all other capacities: Efficiency: min.[a] Economizer: C403.5[b]	Efficiency: min.[a] Economizer: C403.5[b]
3. Water Source Heat Pump	Efficiency: min.[a] Economizer: C403.5[b]	For units ≤ 72,000 Btuh, comply with at least two of three measures: 1. Efficiency: + 10%[e] 2. Flow control valve[g] 3. Economizer: 50%[f] For all other capacities: Efficiency: min.[a] Economizer: C403.5[b]	For units ≤ 72,000 Btuh, comply with at least two of three measures: 1. Efficiency: + 10%[e] 2. Flow control valve[g] 3. Economizer: 50%[f] (except for certain pre-1991 systems[h]) For all other capacities: Efficiency: min.[a] Economizer: C403.5[b]	Efficiency: min.[a] Economizer: C403.5[b] (except for certain pre-1991 systems[q])
4. Water Economizer using Air-Cooled Heat Rejection Equipment (Dry Cooler)	Efficiency: min.[a] Economizer: C403.5[b]	Efficiency: +5%[d] Economizer: shall not decrease existing economizer capacity	Efficiency: min.[a] Economizer: C403.5[b]	Efficiency: min.[a] Economizer: C403.5[b]
5. Air-Handling Unit (including fan coil units) where the system has an air-cooled chiller	Efficiency: min.[a] Economizer: C403.5b	Economizer: shall not decrease existing economizer capacity	Efficiency: min.[a] Economizer: C403.5[b] (except for certain pre-1991 systems[q])	Efficiency: min.[a] Economizer: C403.5[b] (except for certain pre-1991 systems[q])
6. Air- Handling Unit (including fan coil units) and Water-cooled Process Equipment, where the system has a water-cooled chiller[j]	Efficiency: min.[a] Economizer: C403.5[b]	Economizer: shall not decrease existing economizer capacity	Efficiency: min.[a] Economizer: C403.5[b] (except for certain pre-1991 systems[h] and certain 1991-2016 systems[i].)	Efficiency: min.[a] Economizer: C403.5[b] (except for certain pre-1991 systems[h] and certain 1991-2016 systems[i])
7. Cooling Tower	Efficiency: min.[a] Economizer: C403.5[b]	No requirements	Efficiency: min.[a] Economizer: C403.5[b]	Efficiency: min.[a] Economizer: C403.5[b]
8. Air-Cooled Chiller	Efficiency: min.[a] Economizer: C403.5[b]	Efficiency: + 10%[k] Economizer: shall not decrease existing economizer capacity	Efficiency: Comply with two of two measures: 1. + 10%[k,l] 2. Multistage Economizer: shall not decrease existing economizer capacity	Efficiency: min.[a] Economizer: C403.5[b]
9. Water-Cooled Chiller	Efficiency: min.[a] Economizer: C403.5[b]	Efficiency: Comply with at least one of two measures: 1. Part load IPLV + 15%[n] 2. Plate frame heat exchanger[o] Economizer: shall not decrease existing economizer capacity	Efficiency: Comply with two of two measures: 1. Part load IPLV + 15%[n] 2. Plate frame heat exchanger[o] Economizer: shall not decrease existing economizer capacity	Efficiency: min.[a] Economizer: C403.5[b]

a. Minimum equipment efficiency shall comply with Section C403.3.2 and Tables C403.3.2(1) through ((~~C403.3.2(12)~~)) C403.3.2(13).
b. All separate new equipment and replacement equipment shall have air economizer complying with Section C403.5 including both the individual unit size limits and the total building capacity limits on units without economizer. It is acceptable to comply using one of the exceptions to Section C403.5.
c. Reserved.
d. Equipment shall have a capacity-weighted average cooling system efficiency that is 5 percent better than the requirements in Tables C403.3.2(1) and C403.3.2(2) (1.05 × values in Tables C403.3.2(1) and C403.3.2(2)).
e. Equipment shall have a capacity-weighted average cooling system efficiency that is 10 percent better than the requirements in Tables C403.3.2(1)A and C403.3.2(2) (1.10 × values in Tables C403.3.2(1)A and C403.3.2(2)).
f. Minimum of 50 percent air economizer that is ducted in a fully enclosed path directly to every heat pump unit in each zone, except that ducts may terminate within 12 inches of the intake to an HVAC unit provided that they are physically fastened so that the outside air duct is directed into the unit intake. If this is an increase in the amount of outside air supplied to this unit, the outside air supply system shall be configured to provide this additional outside air and be equipped with economizer control.
g. Water-source heat pump systems shall have a flow control valve to eliminate flow through the heat pumps that are not in operation and variable speed pumping control complying with Section C403.4.3 for that heat pump.
   - When the total capacity of all units with flow control valves exceeds 15 percent of the total system capacity, a variable frequency drive shall be installed on the main loop pump.
   - As an alternate to this requirement, the capacity-weighted average cooling system efficiency shall be 5 percent better than the requirements in footnote e for water-source heat pumps (i.e. a minimum of 15 percent better than the requirements in Table C403.3.2(2) (1.15 × values in Table C403.3.2(2)).
h. Water economizer equipment shall have a capacity-weighted average cooling system efficiency that is 10 percent better than the requirements in Tables C403.3.2(8) and C403.3.2(9) (1.10 × values in Tables C403.3.2(8) and C403.3.2(9)).
i. Air economizer is not required for systems installed with water economizer plate and frame heat exchanger complying with previous codes between 1991 and June 2016, provided that the total fan coil load does not exceed the existing or added capacity of the heat exchangers.
j. For water-cooled process equipment where the manufacturers specifications require colder temperatures than available with water-side economizer, that portion of the load is exempt from the economizer requirements.
k. The air-cooled chiller shall have an IPLV efficiency that is a minimum of 10 percent greater than the IPLV requirements in EER in Table C403.3.2(7)(1.10 × IPLV values in EER in Table C403.3.2(7)).
l. The air-cooled chiller shall be multistage with a minimum of two compressors.
m. ((~~The water-cooled chiller shall have full load and part load IPLV efficiency that is a minimum of 5 percent greater than the IPLV requirements in Table C403.3.2(7) (1.05 × IPLV values in Table C403.3.2(7)).~~))
n. The water-cooled chiller shall have an IPLV value that is a minimum of 15 percent lower than the IPLV requirements in Table C403.3.2(7), (((~~1.15~~)) 0.85 × IPLV values in Table C403.3.2(7)). Water-cooled centrifugal chillers designed for non-standard conditions shall have an NPLV value that is at least 15 percent lower than the adjusted maximum NPLV rating in kW per ton defined in Section C403.3.2.1 (((~~1.15~~)) 0.85 × NPLV).
o. Economizer cooling shall be provided by adding a plate-frame heat exchanger on the water-side with a capacity that is a minimum of 20% of the chiller capacity at standard AHRI rating conditions.
p. Reserved.
q. Systems installed prior to 1991 without fully utilized capacity are allowed to comply with Option B, provided that the individual unit cooling capacity does not exceed 90,000 Btuh.

C503.4.4 Controls for cooling equipment replacement. When space cooling equipment is replaced, controls shall comply with all requirements under Section C403.3.5 and related subsections, and Section C403.5.1. for integrated economizer control.

C503.4.5 Cooling equipment relocation. Existing equipment currently in use may be relocated within the same floor or same tenant space if removed and reinstalled within the same permit.

C503.4.6 New and replacement HVAC heating system equipment. For substantial alterations as defined in Section C503.8.1, or where a building's central HVAC heating system equipment is augmented or replaced, the building shall comply with Section C403.1.4.

Exception: Where only one heating appliance is failing and is replaced by another having the same or lesser heating capacity and the same or higher efficiency, no other alterations are made to the central HVAC system, and this exception has not been used within the same building in the previous 24-month period, this provision does not apply.

SDCI Informative Note: The term "central HVAC heating system" for the purposes of this section means a heating system that provides heating to multiple spaces or multiple dwelling or sleeping units (as opposed to a distributed heating system such as a baseboard heater or PTHP that provides heating to only a single space). A central heating system may include multiple pieces of heating equipment.

The exception permits like-for-like replacement of a single boiler, furnace or heat pump, where no other HVAC work is planned, so that a failed heating appliance can be expediently replaced.

C503.5 Service hot water systems. New service hot water systems that are part of the *alteration* shall comply with Section C404.

Exception: Where only one service hot water appliance is failing and is replaced by another having the same or lesser heating capacity and the same or higher efficiency, no other alterations are made to the central service hot water system, and this exception has not been used within the same building in the previous 24-month period, this provision does not apply.

C503.6 Lighting, ((~~controlled~~)) receptacles and motors. *Alterations* or the addition of lighting, ((~~controlled~~)) receptacles and motors shall comply with Sections C503.6.1 through C503.6.6.

C503.6.1 Luminaire additions and alterations. *Alterations* that add, alter or replace ((~~50~~)) 20 percent or more of the luminaires or of the lamps plus ballasts alone in a space enclosed by walls or ceiling-height partitions, replace ((~~50~~)) 20 percent or more of parking garage luminaires, or replace ((~~50~~)) 20 percent or more of the total installed wattage of exterior luminaires shall comply with Sections C405.4 and C405.5. Where less than ((~~50~~)) 20 percent of the fixtures in an interior space enclosed by walls or ceiling-height partitions or in a parking garage are added or replaced, or less than ((~~50~~)) 20 percent of the installed exterior wattage is replaced, the installed lighting wattage shall be maintained or reduced.

C503.6.2 Rewiring and recircuiting. Where new wiring is being installed to serve added fixtures and/or fixtures are being relocated to a new circuit, controls shall comply with Sections C405.2.1, C405.2.3, C405.2.4, C405.2.5, and C405.2.6, and as applicable C408.3. New lighting control devices shall comply with the requirements of Section C405.2.

C503.6.3 New or moved lighting panel. Where a new lighting panel (or a moved lighting panel) with all new raceway and conductor wiring from the panel to the fixtures is being installed, controls shall also comply with, in addition to the requirements of Section C503.6.2, all ((~~remaining~~)) requirements in Sections C405.2 and C408.3.

C503.6.4 Newly-created rooms. Where new walls or ceiling-height partitions are added to an existing space and create a new enclosed space, but the lighting fixtures are not being changed, other than being relocated, the new enclosed space shall have controls that comply with Sections C405.2.1, C 405.2.2, C405.2.3, C405.2.4, C405.2.5 and C408.3.

C503.6.5 Motors. Those motors which are altered or replaced shall comply with Section C405.8. In no case shall the energy efficiency of the building be decreased.

C503.6.6 Controlled receptacles. Where electric receptacles are added or replaced, controlled receptacles shall be provided in accordance with Section C405.10.

Exceptions:

1. Where an alteration project impacts an area smaller than 5,000 square feet, controlled receptacles are not required.
2. Where existing systems furniture or partial-height relocatable office cubicle partitions are reconfigured or relocated within the same area, controlled receptacles are not required in the existing systems furniture or office cubicle partitions.
3. Where new or altered receptacles meet ((~~the~~)) exception 1 to Section C405.10, they are not required to be *controlled receptacles* or be located within 12 inches of non-*controlled receptacles*.

C503.7 Refrigeration systems. Those parts of systems which are altered or replaced shall comply with Section C410. Additions or alterations shall not be made to an existing refrigerated space or system that will cause the existing mechanical system to become out of compliance. All new refrigerated spaces or systems in existing buildings, including refrigerated display cases, shall comply with Section C410.

C503.8 Substantial alterations or repairs. In addition to meeting the requirements of this code, any building or structure to which substantial alterations or repairs are made shall comply with the requirements of this section.

Exceptions:

1. *Alterations* and repairs to landmark buildings shall comply with this section to the extent that the *code official* determines that such compliance does not have an adverse effect on the designated historic features of the building. The energy use allowed by subsections 2, 3 or 4 of Section C503.8.3 is permitted to be increased in proportion to the additional energy use required for preservation of such designated features.
2. A project that is defined as a substantial alteration primarily due to the seismic retrofitting of a building's unreinforced masonry walls is exempt from the requirements of this section.
3. A building constructed in compliance with the 2003 or more recent edition of the Seattle Building Code that would be classified as a substantial alteration only due to being reoccupied after being substantially vacant for more than 24 months is exempt from the requirements of this section.

C503.8.1 Definition. For the purposes of this section, substantial alterations or repairs means items 1, 2 or 4, or any combination thereof, of the definition of substantial alterations or repairs in Chapter 3 of the Seattle amendments to the IEBC, as determined by the *code official.*

SDCI Informative Note: Definitions 1, 2 and 4 of "substantial alterations or repairs" in the Seattle Existing Building Code are as follows:

1. Repair of a building with a damage ratio of 60 percent or more.
2. Remodeling or *additions* that substantially extend the useful physical and/or economic life of the building or a significant portion of the building, other than typical tenant remodeling.
4. Re-occupancy of a building that has been substantially vacant for more than 24 months in occupancies other than Group R-3.

C503.8.2 Pre-submittal conference. The applicant shall attend a pre-submittal conference to discuss the selected compliance path. Prior to this conference, the applicant shall meet with each energy utility serving the building to determine whether technical assistance or financial incentives are available for energy efficiency upgrades, and shall submit documentation of these meetings at the pre-submittal conference.

C503.8.3 Energy efficiency. Buildings undergoing substantial alterations shall comply with Section C503.4.6 and one of the following:

1. **Full code compliance.** Fully comply with the requirements of this code for new construction, including Section C406.
2. **Envelope thermal performance within 15 percent of code.** Demonstrate that heat loss through the building envelope is no more than 15 percent greater than allowed by the Seattle Energy Code, using the Component Performance Building Envelope Option in Section C402.1.5, and meet all other prescriptive requirements of the Seattle Energy Code for new construction, including Section C406.
   - 2.1. **Default *U*-values.** The values listed in Appendix A and Section C303 shall be used as the default *U*-values for existing building envelope components. For buildings whose original construction permits were applied for after January 1, 1992, existing building envelope components are deemed to meet the minimum *U*-values required by the edition of the Seattle Energy Code in effect at the time of permit application, where visual inspection by the *code official* reveals that those components appear to be equal to or better than code-compliant components.
   - 2.2. **Disproportionality.** Where *approved* by the *code official*, the cost of required thermal improvements to the building envelope are not required to exceed 20 percent of the valuation of the substantial alterations project, determined in accordance with the Fee Subtitle, when using this envelope thermal performance compliance method. Envelope improvement costs shall be documented using standard cost estimating software and methodology.
3. **Total building performance within 10 percent of code.** Demonstrate that the Building Performance Factor is no more than 10 percent higher than that permitted by Table C407.3.2.
4. **Operating energy alternative.** The *code official* is permitted to allow calculated building performance factor 20 percent greater than the baseline building design calculated in accordance with the Total Building Performance methodology in Section C407, provided that:
   - a. The applicant demonstrates that constructability, economic, or historic preservation considerations preclude conformance with any of the above options; and
   - b. The owner agrees to operate the building at or below the annual energy use level predicted for that calculated energy performance during a period of 12 consecutive months, concluding no later than three years after issuance of the certificate of occupancy, adjusted as allowed by Sections C401.3.6 through C401.3.10, and to meet the requirements of Sections C401.3.11 through C401.1.5.13, substituting the energy consumption standard in option 4 of this Section C503.8.3 for the energy consumption targets set out in Section C401.3.2.
   - 4.1. **Reporting.** The building owner shall report the energy consumption in kBTU/square foot using automated reporting directly from utilities via Energy Star Portfolio Manager, and shall authorize the *code official* to view the reports directly in Portfolio Manager during the demonstration period.

C503.8.4 Impracticality. In cases where full compliance with all the requirements of Section C503.8 is impractical, the applicant is permitted to arrange a pre-design conference with the design team and the *code official* to seek modifications. The applicant shall identify specific requirements that are impractical, and shall identify design solutions and modifications that achieve a comparable level of energy efficiency. The *code official* is authorized to waive specific requirements in this code to the extent that the *code official* determines those requirements to be impractical.

SECTION C504
REPAIRS

C504.1 General. Buildings and structures, and parts thereof, shall be repaired in compliance with Section C501.3 and this section. Work on nondamaged components that is necessary for the required repair of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter. Routine maintenance required by Section C501.3, ordinary repairs exempt from *permit*, and abatement of wear due to normal service conditions shall not be subject to the requirements for *repairs* in this section.

C504.2 Application. For the purposes of this code, the following shall be considered repairs.

1. Glass only replacements in an existing sash and frame.
2. *Roof repairs.*

((~~3. Air barriers shall not be required for *roof repair* where the repairs to the building do not include *alterations*, renovations or *repairs* to the remainder of the building envelope.~~

~~4. Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided however that an existing vestibule that separates a conditioned space from the exterior shall not be removed.~~))

SDCI Informative Note: Exceptions 3 and 4 appear in the exceptions to Section C503.1.

((~~5. *Repairs* where only the bulb and/or ballast within the existing luminaires in a space are replaced provided that the replacement does not increase the installed interior lighting power.~~))

SDCI Informative Note: For exception 5, see Section C503.6.1.

SECTION C505
CHANGE OF OCCUPANCY OR USE

C505.1 General. Spaces undergoing a change in occupancy shall be brought up to full compliance with this code in the following cases:

1. Any space that is converted from an F, S or U occupancy to an occupancy other than F, S or U.
2. Any space that is converted to a Group R dwelling unit or portion thereof, from another use or occupancy.
3. Any Group R dwelling unit or portion thereof permitted prior to July 1, 2002, that is converted to a commercial use or occupancy.

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Exception: Buildings or spaces that were permitted prior to the 2009 WSEC, or were originally permitted as unconditioned, may comply with this section as follows:

1. Where the component performance alternative in Section C402.1.5 is used to demonstrate compliance with this section, the Proposed Total UA is allowed to be up to 110 percent of the Allowable Total UA. This exception may be applied to the project area alone, or to the existing building and project area combined as a whole building.
2. Where total building performance in Section C407 is used to demonstrate compliance with this section, the total annual carbon emissions from energy consumption of the proposed design is allowed to be 110 percent of the annual carbon emissions from energy consumption allowed by Section C407.3. This exception may be applied to the project area alone, or to the existing building and project area combined as a whole building.

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3. Where the building or space is altered to become a bakery, commercial kitchen or commercial laundry, and the proposed design uses only all-electric Energy Star–rated process equipment and code compliant all-electric HVAC equipment, improvements to the building envelope immediately adjoining the spaces containing that use shall not be required. For the purposes of this exception, no fossil fuel burning equipment of any kind may be installed within the building or space undergoing the *change of occupancy*.

Compliance shall include the provisions of Section C406, applied only to the portion of the building undergoing a *change of occupancy* or use. Where the use in a space changes from one use in Table C405.4.2(1) or (2) to another use in Table C405.4.2(1) or (2), the installed lighting wattage shall comply with Section C405.4.

SECTION C506
METERING FOR EXISTING BUILDINGS

SDCI Informative Note: Section C506.1 was relocated from Section C409.5.

C506.1 Existing buildings that were constructed subject to the requirements of this section. Where new or replacement systems or equipment are installed in an existing building that was constructed subject to the requirements of this section, metering shall be provided for such new or replacement systems or equipment so that their energy use is included in the corresponding end-use category defined in Section C409.3. This includes systems or equipment added in conjunction with *additions* or *alterations* to existing buildings.

C506.1.1 Small existing buildings. In buildings that were constructed subject to Section C409, metering and *data acquisition systems* shall be provided for *additions* over 10,000 square feet in accordance with the requirements of Sections C409.2, C409.3 and C409.4.

C506.2 Metering for the addition or replacement of HVAC equipment in existing buildings. Where HVAC equipment is added or replaced, metering shall be provided according to Sections C506.2.1 or C506.2.2, as applicable.

C506.2.1 Addition or replacement of individual HVAC equipment pieces. Where HVAC equipment is added or replaced, but compliance with Section C506.2.2 is not required, metering shall be provided as follows, and the data from these meters is permitted to either be stored locally using a manual totalizing meter or other means at the meter or fed into a central data collection system.

1. Electrical metering shall be provided for all of the following:
   a. Each new or existing branch circuit serving a new piece of HVAC equipment with minimum circuit ampacity (MCA) that equates to 50 kVA or more. A single meter is permitted to serve multiple circuits of the same sub-metering category from Section C409.3.
   b. Each new or existing branch circuit supplied by a new electrical panel that is dedicated to serving HVAC equipment. It shall be permitted to meter the circuits individually or in aggregate.
   c. Each new HVAC fan or pump on a variable speed drive, where the fan, pump, or variable speed drive are new, unless the variable speed drive is integral to a packaged HVAC unit or the existing variable speed drive does not have the capability to provide electric metering output.
2. Natural gas metering shall be provided for each new natural gas connection that is rated at 1,000 kBTU or higher. A single meter is permitted to serve multiple equipment pieces of the same sub-metering category from Section C409.3; HVAC, water heating or process.

C506.2.2 Addition or replacement of the majority of HVAC equipment in a building. Where permits are issued for new or replacement HVAC equipment that has a total heating and cooling capacity greater than 1,200 kBTU/hour and greater than 50 percent of the building's existing HVAC heating and cooling capacity, within any 12-month period, the following shall be provided for the building:

1. Energy source metering required by Section C409.2.
2. HVAC system end-use metering required by Section C409.3.1.
3. Data acquisition and display system per the requirements of Section C409.4.

Each of the building's existing HVAC chillers, boilers, cooling towers, air handlers, packaged units and heat pumps that has a capacity larger than 5 tons or that represents more than 10 percent of the total heating and cooling capacity of the building shall be included in the calculation of the existing heating and cooling capacity of the building. Where heat pumps are configured to deliver both heating and cooling, the heating and cooling capacities shall both be included in the calculation of the total capacity.

Each of the building's existing and new HVAC chillers, boilers, cooling towers, air handlers, packaged units and heat pumps that has a heating or cooling capacity larger than 5 tons or that represents more than 10 percent of the total heating and cooling capacity of the building shall be included in the HVAC system end-use metering.

Construction documents for new or replacement heating and cooling equipment projects shall indicate the total heating and cooling capacity of the building's existing HVAC equipment and the total heating and cooling capacity of the new or replacement equipment. Where permits have been issued for new or replacement heating and cooling equipment within the 12-month period prior to the permit application date, the heating and cooling capacity of that equipment shall also be indicated. For the purpose of this tabulation, heating and cooling capacities of all equipment shall be expressed in kBTU/hour.

C506.3 Tenant space electrical sub-metering for existing buildings. For tenant improvements in which a single tenant will occupy a full floor or multiple floors of a building, the electrical consumption for the tenant space on that floor shall be separately metered, and the metering data provided to the tenant with a display system per the requirements of Section C409.4.3. For the purposes of this section, separate end use categories need not be segregated.

Exception: Where an existing branch circuit electrical panel serves tenant spaces on multiple full floors of a building, the floors served by that panel are not required to comply with this section.

C506.4 Metering for complete electrical system replacement. If all, or substantially all, of the existing electrical system is replaced under a single electrical permit or within a 12-month period, all of the provisions of Section C409 shall be met.

CHAPTER 6 [CE]

REFERENCED STANDARDS

This chapter lists the standards that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title, and the section or sections of this document that reference the standard. The application of the referenced standards shall be as specified in Section 106.

AAMA

American Architectural Manufacturers Association
1827 Walden Office Square
Suite 550
Schaumburg, IL 60173-4268

Standard reference number	Title	Referenced in code section number
AAMA/WDMA/CSA 101/I.S.2/A C440—17	North American Fenestration Standard/ Specifications for Windows, Doors and Unit Skylights	Table C402.4, C402.4.1.1.2

AHAM

Association of Home Appliance Manufacturers
1111 19th Street, NW, Suite 402
Washington, DC 20036

Standard reference number	Title	Referenced in code section number
ANSI/ AHAM RAC-1—2008	Room Air Conditioners	Table C403.3.2(3)
AHAM HRF-1—2017	Household Refrigerators, Refrigerator-Freezers and Freezers	Table C4410.1(1)(3)

AHRI

Air Conditioning, Heating, and Refrigeration Institute
4100 North Fairfax Drive
Suite 200
Arlington, VA 22203

Standard reference number	Title	Referenced in code section number
ISO/AHRI/ASHRAE 13256-1 (2017)	Water-source Heat Pumps—Testing and Rating for Performance— Part 1: Water-to-air and Brine-to-air Heat Pumps	Table C403.3.2(2)
ISO/AHRI/ASHRAE 13256-2 (2017)	Water-source Heat Pumps—Testing and Rating for Performance—Part 2: Water-to-water and Brine-to-water Heat Pumps	Table C403.3.2(2)
210/240—2016	Unitary Air Conditioning and Air-source Heat Pump Equipment	Table C403.3.2(1), Table C403.3.2(2)
310/380—2014	Standard for Packaged Terminal Air Conditioners and Heat Pumps	Table C403.3.2(3)
340/360—2015	Commercial and Industrial Unitary Air-conditioning and Heat Pump Equipment	Table C403.3.2(1), Table C403.3.2(2)
365—09	Commercial and Industrial Unitary Air-conditioning Condensing Units	Table C403.3.2(1), Table C403.3.2(6)
390—2011	Performance Rating of Single Package Vertical Air Conditioners and Heat Pumps	Table C403.3.2(3)
400—01	Liquid to Liquid Heat Exchangers with Addendum 2	Table C403.3.2(9)
440—08	Room Fan Coil	C403.10.3
460—05	Performance Rating Remote Mechanical Draft Air-cooled Refrigerant Condensers	Table C403.3.2(8)
550/590—03	Water Chilling Packages Using the Vapor Compression Cycle— with Addenda	C403.3.2.1, Table C403.3.2(7)
560—00	Absorption Water Chilling and Water-heating Packages	Table C403.3.2(7)
920—15	Performance Rating of DX-Dedicated Outdoor Air System Units	Table C403.3.2(11), Table C403.3.2(12)

AHRI—continued

1160—2014	Performance Rating of Heat Pump Pool Heaters	Table C404.2
1200—2014	Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets	C410.1.1, Table C410.1.1(1) Table C410.1.1(2)

AMCA

Air Movement and Control Association International
30 West University Drive
Arlington Heights, IL 60004-1806

Standard reference number	Title	Referenced in code section number
205-12	Energy Efficiency Classification for Fans	C403.8.3, C406.2.3
220-08 (R2012)	Laboratory Methods of Testing Air Curtain Units	C402.5.6
500D—10	Laboratory Methods for Testing Dampers for Rating	C403.7.8.3

ANSI

American National Standards Institute
25 West 43rd Street
Fourth Floor
New York, NY 10036

Standard reference number	Title	Referenced in code section number
Z21.10.3/CSA 4.3—11	Gas Water Heaters, Volume III—Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating Tank and Instantaneous	Table C404.2
Z21.47/CSA 2.3—12	Gas-fired Central Furnaces	Table C403.3.2(4)
Z83.8/CSA 2.6—09	Gas Unit Heaters, Gas Packaged Heaters, Gas Utility Heaters and Gas-fired Duct Furnaces	Table C403.3.2(4)

APSP

The Association of Pool and Spa Professionals
2111 Eisenhower Avenue
Alexandria, VA 22314

Standard reference number	Title	Referenced in code section number
14-2014	American National Standard for Portable Electric Spa Efficiency	C404.8

ASHRAE

American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
1791 Tullie Circle, NE
Atlanta, GA 30329-2305

Standard reference number	Title	Referenced in code section number
ANSI/ASHRAE/ACCA Standard 127-2007	Method of Testing for Rating Computer and Data Processing Room Unitary Air Conditioners	C403.4.1
Standard 183—2007	Peak Cooling and Heating Load Calculations in Buildings, Except Low-rise Residential Buildings	C403.1.2
ANSI/ASHRAE/ASHE Standard 170-2017	Ventilation of Health Care Facilities	C403.1.1
ASHRAE—2016	ASHRAE HVAC Systems and Equipment Handbook—2004	C403.1.2
ISO/AHRI/ASHRAE 13256-1 (2011)	Water-source Heat Pumps—Testing and Rating for Performance—Part 1: Water-to-air and Brine-to-air Heat Pumps	Table C403.3.2(2)
ISO/AHRI/ASHRAE 13256-2 (2011)	Water-source Heat Pumps—Testing and Rating for Performance—Part 2: Water-to-water and Brine-to-water Heat Pumps	Table C403.3.2(2)
90.1—((~~2016~~)) 2019	Energy Standard for Buildings Except Low-rise Residential Buildings	C402.1.5.1, C407.3

ASHRAE—continued

90.4—((~~2016~~)) 2019	Energy Standard for Data Centers	C403.1.3
146—2011	Testing and Rating Pool Heaters	Table C404.2

ASME

American Society Mechanical Engineers
Two Park Avenue
New York, NY 10016-5990

Standard reference number	Title	Referenced in code section number
ASME A17.1/ CSA B44—2016	Safety Code for Elevators and Escalators	C405.9.2

ASTM

ASTM International
100 Barr Harbor Drive
West Conshohocken, PA 19428-2859

Standard reference number	Title	Referenced in code section number
C 90—14	Specification for Load-bearing Concrete Masonry Units	Table C402.1.3
C 518—17	Standard Test Method for Steady-State Thermal Transmission Properties By Means of the Heat Flow Meter Apparatus	Table C403.10.1.1
C 1371—11	Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers	C303.1.4.1, Table C402.1.4
D 1003—13	Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics	C402.4.2.2
E 283—04	Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen	C402.5.8,
E779—10	Standard Test Method for Determining Air Leakage Rate by Fan Pressurization	C402.5.1.2, C406.11.1

CSA

Canadian Standards Association
5060 Spectrum Way
Mississauga, Ontario, Canada L4W 5N6

Standard reference number	Title	Referenced in code section number
AAMA/WDMA/CSA 101/I.S.2/A440—17	North American Fenestration Standard/Specification for Windows, Doors and Unit Skylights	Table C402.4, C402.4.1.1.2
CSA B55.1—2012	Test Method for Measuring Efficiency and Pressure Loss of DWHR Units	C404.10
CSA B55.2—2012	Drain Water Heat Recovery Units	C404.10

CTI

Cooling Technology Institute
2611 FM 1960 West, Suite A-101
Houston, TX 77068

Standard reference number	Title	Referenced in code section number
ATC 105 (00)	Acceptance Test Code for Water Cooling Tower	Table C403.3.2(8)
ATC 105S—2011	Acceptance Test Code for Closed Circuit Cooling Towers	Table C403.3.2(8)
ATC 106—2011	Acceptance Test for Mechanical Draft Evaporative Vapor Condensers	Table C403.3.2(8)
STD 201 RS(15)	Standard for Certification of Water Cooling Towers Thermal Performances	Table C403.3.2(8)

DASMA

Door and Access Systems Manufacturers Association
1300 Sumner Avenue
Cleveland, OH 44115-2851

Standard reference number	Title	Referenced in code section number
105—92 (R2004)—13	Test Method for Thermal Transmittance and Air Infiltration of Garage Doors	C303.1.3

DOE

U.S. Department of Energy
c/o Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402-9325

Standard reference number	Title	Referenced in code section number
10 CFR, Part 430—1998	Energy Conservation Program for Consumer Products: Test Procedures and Certification and Enforcement Requirement for Plumbing Products; and Certification and Enforcement Requirements for Residential Appliances; Final Rule	Table C403.3.2(4), Table C403.3.2(5), Table C404.2
10 CFR, Part 430, Subpart B, Appendix N—1998	Uniform Test Method for Measuring the Energy Consumption of Furnaces and Boilers	C202
10 CFR, Part 431—2004	Energy Efficiency Program for Certain Commercial and Industrial Equipment: Test Procedures and Efficiency Standards; Final Rules	Table C403.3.2(5), Table C406.2(5)
NAECA 87—(88)	National Appliance Energy Conservation Act 1987 [(Public Law 100-12 (with Amendments of 1988-P.L. 100-357)]	Tables C403.3.2(1), (2), (4)

HVI

Home Ventilating Institute
1740 Dell Range Blvd., Ste H.450
Cheyenne, WY 82009

Standard reference number	Title	Referenced in code section number
HVI 916—2015	Home Ventilating Institute Airflow Test Procedure 916-2015	C403.8.4
HVI 920—2020	Product Performance Certification Procedure Including Verification and Challenge 920-2020	C403.3.6

IAPMO

International Association of Plumbing and Mechanical Officials
4755 E. Philadelphia Street
Ontario, CA 91761

Standard reference number	Title	Referenced in code section number
UPC—2018	Uniform Plumbing Code	C201.3, C501.4

ICC

International Code Council, Inc.
500 New Jersey Avenue, NW
6th Floor
Washington, DC 20001

Standard reference number	Title	Referenced in code section number
IBC—18	International Building Code	C201.3, C303.1.1, C303.2, C402.5.3, C402.5.4 Table C403.3.5, C405.2.1.5, C405.2.5, C411.4, C501.4
IEBC—18	International Existing Building Code	C201.3, 501.4

CHAPTER 1 [RE]

SCOPE AND ADMINISTRATION

SECTION R101
SCOPE AND GENERAL REQUIREMENTS

[S] R101.1 Title. This code, consisting of Chapter 1 [RE] through Chapter 5 [RE] and Appendices A through C, shall be known as the ((~~Washington State Energy Code-Residential~~)) "Seattle Residential Energy Code," and shall be cited as such. It is referred to herein as "this code."

SDCI Informative Note: The Seattle Residential Energy Code consists of Chapter 1 [RE] through Chapter 6 [RE] and Appendices A through E.

R101.2 Scope. This code applies to residential buildings and the buildings sites and associated systems and equipment. This code shall be the maximum and minimum energy code for residential construction in each town, city and county. Residential sleeping units, Group I-1, Condition 2 assisted living facilities licensed by Washington state under chapter 388-78A WAC and Group I-1, Condition 2 residential treatment facilities licensed by Washington state under chapter 246-337 WAC shall utilize the commercial building sections of the energy code regardless of the number of stories of height above grade plane.

R101.3 Intent. This code shall regulate the design and construction of *buildings* for the effective use and conservation of energy over the useful life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

R101.4 Applicability. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

[S] R101.4.1 Mixed residential and commercial buildings. Where a *building* includes both *residential* building and *commercial building* portions, each portion shall be separately considered and meet the applicable provisions of the ((~~WSEC~~)) Seattle Energy Code—Commercial Provisions or ((~~WSEC~~)) Seattle Energy Code—Residential Provisions.

[S] R101.4.1 Mixed residential and commercial buildings. Where a building includes both *residential* building and *commercial* building portions, each portion shall be separately considered and meet the applicable provisions of the ((~~WSEC~~)) Seattle Energy Code—Commercial Provisions or ((~~WSEC~~)) Seattle Energy Code—Residential Provisions.

[S] R101.5 Compliance. *Residential buildings* shall meet the provisions of ((~~WSEC~~)) Seattle Energy Code—Residential Provisions. *Commercial buildings* shall meet the provisions of ((~~WSEC~~)) Seattle Energy Code—Commercial Provisions.

R101.5.1 Compliance materials. The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

[S] R101.6 Landmark buildings. The building official may modify the specific requirements of this code for *landmarks* and require in lieu thereof alternate requirements that the *code official* determines will not have an adverse effect on the designated historic features of the building and will result in a reasonable degree of energy efficiency. A *landmark* is a building or structure that is subject to a requirement to obtain a certificate of approval from the City Landmarks Preservation Board before altering or making significant changes to specific features or characteristics, that has been nominated for designation or has been designated for preservation by the City Landmarks Preservation Board, that has been designated for preservation by the State of Washington, has been listed or determined eligible to be listed in the National Register of Historic Places, or is located in a landmark or special review district subject to a requirement to obtain a certificate of approval before making a change to the external appearance of the structure.

SECTION R102
ALTERNATIVE MATERIALS, DESIGN AND METHODS OF CONSTRUCTION AND EQUIPMENT

[S] R102.1 General. The provisions of this code ((~~are not intended to~~)) do not prevent the installation of any material or to prohibit any design or method of construction prohibited by this code or not specifically ((~~prescribed~~)) allowed by this code. The code official shall have the authority to approve an alternate material, design or method of construction upon application of the owner or the owner's authorized agent. The code official shall first find that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code for strength, effectiveness, fire resistance, durability and safety. Where the alternative material, design or method of construction is not *approved*, the code official shall respond in writing, stating the reasons why the alternative was not *approved*.

The *code official* may approve an alternate material, method of construction, design or insulating system, provided the *code official* finds that the proposed alternate complies with the provisions of this code, and that the alternate, when considered together with other safety features of the building or other relevant circumstances, will provide at least an equivalent level of strength, effectiveness, fire resistance, durability, safety and sanitation.

The *code official* may require that sufficient evidence or proof be submitted to reasonably substantiate any claims regarding the use or suitability of the alternate. The *code official* may, but is not required to, record the approval of modifications and any relevant information in the files of the *code official* or on the approved permit plans.

[S] R102.2 Modifications. The *code official* may modify the requirements of this code for individual cases provided the code *official* finds: (1) there are practical difficulties involved in carrying out the provisions of this code; (2) the modification is in conformity with the intent and purpose of this code; (3) the modification will provide a reasonable level of fire protection and structural integrity when considered together with other safety features of the building or other relevant circumstances, and (4) the modification maintains or improves the energy efficiency of the building. The *code official* may, but is not required to, record the approval of modifications and any relevant information in the files of the *code official* or on the approved permit plans.

[S] SECTION R103
((~~CONSTRUCTION DOCUMENTS~~)) APPLICATIONS AND PERMITS

[S] R103.1 General. A permit for work performed according to this code shall be obtained in accordance with Chapter 1 of the International Residential Code, International Building Code, International Mechanical Code or Seattle Electrical Code.

[S] R103.2 Construction documents. Construction documents, technical reports and other supporting data shall ((~~be submitted in one or more sets with each application for a permit. The construction documents and technical reports shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *code official* is authorized to require necessary construction documents to be prepared by a registered design professional~~)) comply with this section and the International Residential Code, the International Building Code, the International Mechanical Code, the International Existing Buildings Code and the Seattle Electrical Code.

((~~**Exception:** The *code official* is authorized to waive the requirements for construction documents or other supporting data if the *code official* determines they are not necessary to confirm compliance with this code.~~))

R103.2.1 Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, the following as applicable:

1. Insulation materials and their *R*-values.
2. Fenestration *U*-factors and SHGCs.
3. Area-weighted *U*-factor and SHGC calculations.
4. Mechanical system design criteria.
5. Mechanical and service water heating system and equipment types, sizes and efficiencies.
6. Equipment and systems controls
7. Duct sealing, duct and pipe insulation and location.
8. Air sealing details.

((~~**R103.2.1**~~)) **R103.2.2 Building thermal envelope depiction.** The building's thermal envelope shall be represented on the construction documents.

[S] ((~~R103.3 Examination of documents.~~ ~~The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances. The *code official* is authorized to utilize a registered design professional, or other *approved* entity not affiliated with the building design or construction, in conducting the review of the plans and specifications for compliance with the code.~~

~~**R103.3.1 Approval of construction documents.** When the *code official* issues a permit where construction documents are required, the construction documents shall be endorsed in writing and stamped "Reviewed for Code Compliance." Such *approved* construction documents shall not be changed, modified or altered without authorization from the *code official*. Work shall be done in accordance with the *approved* construction documents.~~

~~One set of construction documents so reviewed shall be retained by the *code official*. The other set shall be returned to the applicant, kept at the site of work and shall be open to inspection by the *code official* or a duly authorized representative.~~

~~**R103.3.2 Previous approvals.** This code shall not require changes in the construction documents, construction or designated occupancy of a structure for which a lawful permit has been heretofore issued or otherwise lawfully authorized, and the construction of which has been pursued in good faith within 180 days after the effective date of this code and has not been abandoned.~~

~~**R103.3.3 Phased approval.** The *code official* shall have the authority to issue a permit for the construction of part of an energy conservation system before the construction documents for the entire system have been submitted or *approved*, provided adequate information and detailed statements have been filed complying with all pertinent requirements of this code. The holders of such permit shall proceed at their own risk without assurance that the permit for the entire energy conservation system will be granted.~~))

[S] ((~~R103.4 Amended construction documents.~~ ~~Work shall be installed in accordance with the *approved* construction documents, and any changes made during construction that are not in compliance with the *approved* construction documents shall be resubmitted for approval as an amended set of construction documents.~~))

[S] ((~~R103.5 Retention of construction documents.~~ ~~One set of *approved* construction documents shall be retained by the *code official* for a period of not less than 180 days from date of completion of the permitted work, or as required by state or local laws.~~))

SECTION R104
INSPECTIONS

[S] R104.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official* ((~~or his or her designated agent, and such construction or work shall remain visible and able to be accessed for inspection purposes until *approved*~~)) in accordance with this section, the International Residential Code or International Building Code, and the Seattle Electrical Code. ((~~It shall be the duty of the permit applicant to cause the work to remain visible and able to be accessed for inspection purposes. Neither the code official nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.~~))

R104.2 Required inspections. The *code official* or his or her designated agent, upon notification, shall make the inspections set forth in Sections R104.2.1 through R104.2.5.

R104.2.1 Footing and foundation inspection. Inspections associated with footings and foundations shall verify compliance with the code as to *R-value*, location, thickness, depth of burial and protection of insulation as required by the code and *approved* plans and specifications.

R104.2.2 Framing and rough-in inspection. Inspections at framing and rough-in shall be made before application of interior finish and shall verify compliance with the code as to types of insulation and corresponding R-values and their correct location and proper installation; fenestration properties (U-factor and SHCG) and proper installation; and air leakage controls as required by the code and approved plans and specifications.

R104.2.2.1 Wall insulation inspection. The building official, upon notification, shall make a wall insulation inspection in addition to those inspections required in Section R109 of the *International Residential Code*. This inspection shall be made after all wall and cavity insulation is in place and prior to cover.

((~~C104.2.3~~)) R104.2.3 Plumbing rough-in inspection. Inspections at plumbing rough-in shall verify compliance as required by the code and approved plans and specifications as to types of insulation and corresponding R-values and protection, and required controls.

((~~C104.2.4~~)) R104.2.4 Mechanical rough-in inspection. Inspections at mechanical rough-in shall verity compliance as required by the code and approved plans and specifications as to installed HVAC equipment type and size, required controls, system insulation and corresponding R-value, system air leakage control, programmable thermostats, dampers, whole-house ventilation and minimum fan efficiency.

Exception: Systems serving multiple dwelling units shall be inspected in accordance with Section C104.2.4.

R104.2.5 Final inspection. The building shall have a final inspection and not be occupied until *approved*.

R104.3 Reinspection. A building shall be reinspected when determined necessary by the *code official*.

[S] ((~~R104.4 Approved inspection agencies.~~ ~~The *code official* is authorized to accept reports of third-party inspection agencies not affiliated with the *building* design or construction, provided that such agencies are *approved* as to qualifications and reliability relevant to the *building* components and systems that they are inspecting.~~))

R104.5 Inspection requests. It shall be the duty of the holder of the permit or their duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

R104.6 Reinspection and testing. Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.

[S] ((~~R104.7 Approval.~~ ~~After the prescribed tests and inspections indicate that the work complies in all respects with this code, a notice of approval shall be issued by the *code official*.~~

~~**R104.7.1 Revocation.** The *code official* is authorized to, in writing, suspend or revoke a notice of approval issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the *building* or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.~~))

SECTION R105
VALIDITY

R105.1 General. If a portion of this code is held to be illegal or void, such a decision shall not affect the validity of the remainder of this code.

SECTION R106
REFERENCED STANDARDS

R106.1 Referenced codes and standards. The codes and standards referenced in this code shall be those listed in Chapter 5, and such codes and standards shall be considered as part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections R106.1.1 and R106.1.2.

[S] R106.1.1 ((~~Conflicts~~)) References to other codes. ((~~Where conflicts occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.~~)) Whenever an International, National or Uniform Code is referenced in this code, it means the Seattle edition of that code, including local amendments. References to the "Residential Code", "Fire Code", "Electrical Code", "Mechanical Code" and "Plumbing Code" mean the Seattle editions of those codes.

R106.1.2 Provisions in referenced codes and standards. Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.

R106.2 Application of references. References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section or provision of this code.

[S] R106.3 Other laws. The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law. ((~~In addition to the requirements of this code, all occupancies shall conform to the provisions included in the state building code (chapter 19.27 RCW). In case of conflicts among codes enumerated in RCW 19.27.031(1) through (4) and this code, an earlier named code shall govern over those following.~~)) In the case of conflict between the duct sealing and insulation requirements of this code and the duct insulation requirements of Sections 603 and 604 of the *International Mechanical Code*, the duct insulation requirements of this code shall govern.

SECTION R107
FEES

[S] R107.1 Fees. ((~~A permit shall not be issued until the fees prescribed in Section R107.2 have been paid, nor shall an amendment to a permit be released until the additional fee, if any, has been paid.~~)) A fee for each permit and for other activities related to the enforcement of this code shall be paid as set forth in the Fee Subtitle, Seattle Municipal Code Title 22, Subtitle IX.

[S] ((~~R107.2 Schedule of permit fees.~~ ~~A fee for each permit shall be paid as required, in accordance with the schedule as established by the applicable governing authority.~~))

[S] ((~~R107.3 Work commencing before permit issuance.~~ ~~Any person who commences any work before obtaining the necessary permits shall be subject to an additional fee established by the *code official*, which shall be in addition to the required permit fees.~~))

[S] ((~~R107.4 Related fees.~~ ~~The payment of the fee for the construction, *alteration*, removal or demolition of work done in connection to or concurrently with the work or activity authorized by a permit shall not relieve the applicant or holder of the permit from the payment of other fees that are prescribed by law.~~))

[S] ((~~R107.5 Refunds.~~ ~~The *code official* is authorized to establish a refund policy.~~))

[S] SECTION R108
((~~STOP WORK ORDER~~)) ENFORCEMENT

[S] R108.1 Authority. ((~~Whenever the *code official* finds any work regulated by this code being performed in a manner either contrary to the provisions of this code or dangerous or unsafe, the *code official* is authorized to issue a stop work order.~~)) The *code official* is authorized to enforce this code in accordance with the International Residential Code, International Building Code, International Mechanical Code and Seattle Electrical Code.

[S] ((~~R108.2 Issuance.~~ ~~The stop work order shall be in writing and shall be given to the owner of the property involved, to the owner's authorized agent, or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order and the conditions under which the cited work will be permitted to resume.~~))

[S] ((~~R108.3 Emergencies.~~ ~~Where an emergency exists, the *code official* shall not be required to give a written notice prior to stopping the work.~~))

[S] ((~~R108.4 Failure to comply.~~ ~~Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be subject to a fine as set by the applicable governing authority.~~))

SECTION R109
((~~BOARD OF APPEALS~~)) ADMINISTRATIVE REVIEW

[S] ((~~R109.1 General.~~ ~~In order to hear and decide appeals of orders, decisions or determinations made by the *code official* relative to the application and interpretation of this code, there shall be and is hereby created a board of appeals. The *code official* shall be an ex officio member of said board but shall have no vote on any matter before the board. The board of appeals shall be appointed by the governing body and shall hold office at its pleasure. The board shall adopt rules of procedure for conducting its business, and shall render all decisions and findings in writing to the appellant with a duplicate copy to the *code official*.~~))

[S] ((~~R109.2 Limitations on authority.~~ ~~An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply or an equally good or better form of construction is proposed. The board shall have no authority to waive requirements of this code.~~))

[S] ((~~R109.3 Qualifications.~~ ~~The board of appeals shall consist of members who are qualified by experience and training and are not employees of the jurisdiction.~~))

[S] R109.1 Administrative review by the *code official*. Applicants may request administrative review by the *code official* of decisions or actions pertaining to the administration and enforcement of this code. Requests shall be addressed to the *code official*.

[S] R109.2 Administrative review by the Construction Codes Advisory Board. Applicants may request review by the Construction Codes Advisory Board of decisions or actions pertaining to the application and interpretation of this code. The review will be performed by a panel of three or more members of the Construction Codes Advisory Board, chosen by the Board Chair. The Chair shall consider the subject of the review and members' expertise when selecting members to conduct a review. The decision of the review panel is advisory only; the final decision is made by the *code official*.

[S] SECTION R110
VIOLATIONS

It shall be unlawful for any person, firm, or corporation to erect or construct any building, or remodel or rehabilitate any existing building or structure in the state, or allow the same to be done, contrary to or in violation of any of the provisions of this code. Violations shall be administered according to the procedures set forth in Section 103 of the International Building Code or Section R103 the International Residential Code, as applicable.

[S] SECTION R111
LIABILITY

Nothing contained in this code is intended to be nor shall be construed to create or form the basis for any liability on the part of any city or county or its officers, employees or agents for any injury or damage resulting from the failure of a building to conform to the provisions of this code, or by reason or as a consequence of any inspection, notice, order, certificate, permission or approval authorized or issued or done in connection with the implementation or enforcement of this code, or by reason of any action or inaction on the part of the City related in any manner to the enforcement of this code by its officers, employees or agents.

SCOPE AND ADMINISTRATION

This code shall not be construed to relieve or lessen the responsibility of any person owning, operating or controlling any building or structure for any damages to persons or property caused by defects, nor shall the Department of Construction and Inspections or the City of Seattle be held to have assumed any such liability by reason of the inspections authorized by this code or any permits or certificates issued under this code.

TABLE R405.3
CARBON EMISSIONS FACTORS

TYPE	CO_2e (lb/unit)	UNIT
Electricity	0.80	kWh
Natural gas	11.7	Therm
Oil	19.2	Gallon
Propane	10.5	Gallon
Other[a]	195.00	mmBtu
On-site renewable energy	0.00	

a. District energy systems may use alternative emission factors supported by calculations *approved* by the *code official*.

R405.4 Documentation. Documentation of the software used for the performance design and the parameters for the *building* shall be in accordance with Sections R405.4.1 through R405.4.3.

R405.4.1 Compliance software tools. Documentation verifying that the methods and accuracy of the compliance software tools conform to the provisions of this section shall be provided to the *code official*.

R405.4.2 Compliance report. Compliance software tools shall generate a report that documents that the *proposed design* complies with Section R405.3. A compliance report on the *proposed design* shall be submitted with the application for the building permit. Upon completion of the building, a compliance report based on the as-built condition of the building shall be submitted to the code official before a certificate of occupancy is issued. Batch sampling of buildings to determine energy code compliance for all buildings in the batch shall be prohibited.

Compliance reports shall include information in accordance with Sections R405.4.2.1 and R405.4.2.2. Where the *proposed design* of a building could be built on different sites where the cardinal orientation of the building on each site is different, compliance of the *proposed design* for the purposes of the application for the building permit shall be based upon the worst-case orientation, worst-case configuration, worst-case building air leakage and worst-case duct leakage. Such worst-case parameters shall be used as inputs to the compliance software for energy analysis.

R405.4.2.1 Compliance report for permit application. A compliance report submitted with the application for building permit shall include all of the following:

1. Building street address, or other building site identification.
2. A statement indicating that the *proposed design* complies with Section R405.3.
3. An inspection checklist documenting the building component characteristics of the *proposed design* as indicated in Table R405.5.2(1). The inspection checklist shall show results for both the *standard reference design* and the *proposed design* with all user inputs to the compliance software to generate the results.
4. A site-specific energy analysis report that is in compliance with Section R405.3.
5. Name of the individual performing the analysis and generating the report.
6. Name and version of the compliance software tool.

R405.4.2.2 Compliance report for certificate of occupancy. A compliance report submitted for obtaining the certificate of occupancy shall include all of the following:

1. Building street address, or other building site identification.
2. A statement indicating that the as-built building complies with Section R405.3.
3. A certificate indicating that the building passes the performance matrix for code compliance and the energy saving features of the buildings.
4. A site-specific energy analysis report that is in compliance with Section R405.3.
5. Name of the individual performing the analysis and generating the report.
6. Name and version of the compliance software tool.

R405.4.3 Additional documentation. The *code official* shall be permitted to require the following documents:

1. Documentation of the building component characteristics of the *standard reference design*.
2. A certification signed by the builder providing the building component characteristics of the *proposed design* as given in Table R405.5.2(1).
3. Documentation of the actual values used in the software calculations for the *proposed design*.

R405.5 Calculation procedure. Calculations of the performance design shall be in accordance with Sections R405.5.1 and R405.5.2.

R405.5.1 General. Except as specified by this section, the *standard reference design* and *proposed design* shall be configured and analyzed using identical methods and techniques.

R405.5.2 Residence specifications. The *standard reference design* and *proposed design* shall be configured and analyzed as specified by Table R405.5.2(1). Table R405.5.2(1) shall include by reference all notes contained in Table R402.1.1.

TABLE R405.5.2(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Above-grade walls	Type: Mass wall if proposed wall is mass; otherwise wood frame.	As proposed
	Gross area: Same as proposed	As proposed
	U-factor: From Table R402.1.3	As proposed
	Solar absorptance = 0.75	As proposed
	Remittance = 0.90	As proposed
Below-grade walls	Type: Same as proposed	As proposed
	Gross area: same as proposed	As proposed
	U-factor: From Table R402.1.3, with insulation layer on interior side of walls.	As proposed
Above-grade floors	Type: Wood frame	As proposed
	Gross area: Same as proposed	As proposed
	U-factor: From Table R402.1.3	As proposed
Ceilings	Type: Wood frame	As proposed
	Gross area: Same as proposed	As proposed
	U-factor: From Table R402.1.3	As proposed
Roofs	Type: Composition shingle on wood sheathing	As proposed
	Gross area: Same as proposed	As proposed
	Solar absorptance = 0.75	As proposed
	Emittance = 0.90	As proposed
Attics	Type: Vented with aperture = 1 ft^2 per 300 ft^2 ceiling area.	As proposed
Foundations	Type: Same as proposed foundation wall area above and below-grade	As proposed
	Soil characteristics: Same as proposed.	As proposed
Opaque Doors	Area: 40 ft^2	As proposed
	Orientation: North	As proposed
	U-factor: Same as fenestration from Table R402.1.3.	As proposed
Vertical fenestration other than opaque doors[a]	Total area[h] = (a) The proposed glazing area; where proposed glazing area is less than 15% of the conditioned floor area. (b) 15% of the conditioned floor area; where the proposed glazing area is 15% or more of the conditioned floor area.	As proposed
	Orientation: equally distributed to four cardinal compass orientations (N, E, S & W).	As proposed
	U-factor: From Table R402.1.3	As proposed
	SHGC: From Table R402.1.1 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.	As proposed
	Interior shade fraction: 0.92 - (0.21 × SHGC for the standard reference design)	0.92 - (0.21 × SHGC as proposed)
	External shading: None	As proposed
Skylights	None	As proposed

TABLE R405.5.2(1)—continued
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Air exchange rate	Air leakage rate of 5 air changes per hour at a pressure of 0.2 inches w.g. (50 Pa). The mechanical ventilation rate shall be in addition to the air leakage rate and the same as in the proposed design, but not greater than $0.01 \times CFA + 7.5 \times (N_{br} + 1)$ where: CFA = conditioned floor area N_{br} = number of bedrooms Energy recovery shall not be assumed for mechanical ventilation.	As proposed[a]. The mechanical ventilation rate[b] shall be in addition to the air leakage rate and shall be as proposed.
Mechanical ventilation	None, except where mechanical ventilation is specified by the proposed design, in which case: Annual vent fan energy use: $kWh/yr = (1e_f) \times (0.0876 \times CFA + 65.7 \times (N_{br} + 1))$ where: e_f = the minimum exhaust fan efficacy from Table R403.6.1 corresponding to a flow rate of $0.01 \times CFA + 7.5 \times (N_{br}+1)$ CFA = conditioned floor area N_{br} = number of bedrooms	As proposed
Internal gains	IGain = 17,900 + 23.8 × CFA + 4104 × Nbr (Btu/day per dwelling unit)	Same as standard reference design
Internal mass	An internal mass for furniture and contents of 8 pounds per square foot of floor area.	Same as standard reference design, plus any additional mass specifically designed as a thermal storage element[c] but not integral to the building envelope or structure.
Structural mass	For masonry floor slabs, 80% of floor area covered by R-2 carpet and pad, and 20% of floor directly exposed to room air.	As proposed
	For masonry basement walls, as proposed, but with insulation required by Table R402.1.3 located on the interior side of the walls.	As proposed
	For other walls, for ceilings, floors, and interior walls, wood frame construction.	As proposed
Heating systems[d, e]	Where the proposed design utilizes electric heating without a heat pump the standard reference design shall be an air source heat pump meeting the requirements of Section C403 of the WSEC—Commercial Provisions. For all other systems, the same system type as proposed, and the same system efficiency required by prevailing minimum federal standard. Capacity: Sized in accordance with Section R403.6	As proposed
Cooling systems[d, f]	Same system type as proposed. Same system efficiency as required by prevailing minimum federal standard. Capacity: Sized in accordance with Section R403.6.	As proposed
Service water heating[d, e, f, g]	Same system type as proposed. Same system efficiency as required by prevailing minimum federal standard. Use: Same as proposed design	As proposed $gal/day = 30 + (10 \times N_{br})$
Thermal distribution systems	Duct insulation: From Section R403.3.3 A thermal distribution system efficiency (DSE) of 0.93 shall be applied to both the heating and cooling system efficiencies for all systems. **Exception:** For non-ducted heating and cooling systems that do not have a fan, the standard reference design distribution system efficiency (DSE) shall be 1.	As specified in Table R405.5.2(2)
Thermostat	Type: Manual, cooling temperature setpoint = 75°F; Heating temperature setpoint = 72°F	Same as standard reference

For SI: 1 square foot = 0.93 m^2, 1 British thermal unit = 1055 J, 1 pound per square foot = 4.88 kg/m^2, 1 gallon (US) = 3.785 L, °C = (°F - 3)/1.8, 1 degree = 0.79 rad.

a. Where required by the *code official*, testing shall be conducted by an *approved* party. Hourly calculations as specified in the ASHRAE *Handbook of Fundamentals*, or the equivalent, shall be used to determine the energy loads resulting from infiltration.

b. The combined air exchange rate for infiltration and mechanical ventilation shall be determined in accordance with Equation 43 of 2001 ASHRAE *Handbook of Fundamentals*, page 26.24 and the "Whole-house Ventilation" provisions of 2001 ASHRAE *Handbook of Fundamentals*, page 26.19 for intermittent mechanical ventilation.

c. Thermal storage element shall mean a component not part of the floors, walls or ceilings that is part of a passive solar system, and that provides thermal storage such as enclosed water columns, rock beds, or phase-change containers. A thermal storage element must be in the same room as fenestration that faces within 15 degrees (0.26 rad) of true south, or must be connected to such a room with pipes or ducts that allow the element to be actively charged.

d. For a proposed design with multiple heating, cooling or water heating systems using different fuel types, the applicable standard reference design system capacities and fuel types shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each equipment and fuel type present.

e. For a proposed design without a proposed heating system, a heating system with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and proposed design.

f. For a proposed design home without a proposed cooling system, an electric air conditioner with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and the proposed design.

g. For a proposed design with a nonstorage-type water heater, a 40-gallon storage-type water heater with the prevailing federal minimum energy factor for the same fuel as the predominant heating fuel type shall be assumed. For the case of a proposed design without a proposed water heater, a 40-gallon storage-type water heater with the prevailing federal minimum efficiency for the same fuel as the predominant heating fuel type shall be assumed for both the proposed design and standard reference design.

h. For residences with conditioned basements, R-2 and R-4 residences and townhouses, the following formula shall be used to determine fenestration area:

$AF = A_s \times FA \times F$

Where:

AF = Total fenestration area.

A_s = Standard reference design total fenestration area.

FA = (Above-grade thermal boundary gross wall area)/(above-grade boundary wall area + 0.5 x below-grade boundary wall area).

F = (Above-grade thermal boundary wall area)/(above-grade thermal boundary wall area + common wall area) or 0.56, whichever is greater.

and where:

Thermal boundary wall is any wall that separates conditioned space from unconditioned space or ambient conditions.

Above-grade thermal boundary wall is any thermal boundary wall component not in contact with soil.

Below-grade boundary wall is any thermal boundary wall in soil contact.

Common wall area is the area of walls shared with an adjoining dwelling unit.

L and *CFA* are in the same units.

TABLE R405.5.2(2)
DEFAULT DISTRIBUTION SYSTEM EFFICIENCIES FOR PROPOSED DESIGNS[a]

DISTRIBUTION SYSTEM CONFIGURATION AND CONDITION	DISTRIBUTION SYSTEM EFFICIENCY
Distribution system components located in unconditioned space	0.88
Distribution systems entirely located in conditioned space[b]	0.93
Zonal systems[c]	1.00

For SI: 1 cubic foot per minute = 0.47 L/s, 1 square foot = 0.093 m^2, 1 pound per square inch = 6895 Pa, 1 inch water gauge = 1250 Pa.

a. Values given by this table are for distribution systems, which must still meet all prescriptive requirements for duct and pipe system insulation and leakage.

b. Entire system in conditioned space shall mean that no component of the distribution system, including the air-handler unit, is located outside of the conditioned space. All components must be located on the interior side of the thermal envelope (inside the insulation) and also inside of the air barrier. Refrigerant compressors and piping are allowed to be located outside.

c. Zonal systems are systems where the heat source is located within each room. Systems shall be allowed to have forced airflow across a coil but shall not have any ducted airflow external to the manufacturer's air-handler enclosure. Hydronic systems do not qualify.

R405.6 Calculation software tools. Calculation software, where used, shall be in accordance with Sections R405.6.1 through R405.6.3.

R405.6.1 Minimum capabilities. Calculation procedures used to comply with this section shall be software tools capable of calculating the annual energy consumption of all building elements that differ between the *standard reference design* and the *proposed design* and shall include the following capabilities:

1. Calculation of whole-building (as a single zone) sizing for the heating and cooling equipment in the *standard reference design* residence in accordance with Section R403.6.
2. Calculations that account for the effects of indoor and outdoor temperatures and part-load ratios on the performance of heating, ventilating and air-conditioning equipment based on climate and equipment sizing.
3. Printed *code official* inspection checklist listing each of the *proposed design* component characteristics from Table R405.5.2(1) determined by the analysis to provide compliance, along with their respective performance ratings (e.g., *R*-value, *U*-factor, SHGC, HSPF, AFUE, SEER, EF, etc.).

R405.6.2 Specific approval. Performance analysis tools meeting the applicable sections of Section R405 shall be permitted to be *approved.* Tools are permitted to be *approved* based on meeting a specified threshold for a jurisdiction. The *code official* shall be permitted to approve tools for a specified application or limited scope.

R405.6.3 Input values. When calculations require input values not specified by Sections R402, R403, R404 and R405, those input values shall be taken from an *approved* source.

addition comply with this code as a single building, or where the building with the addition uses no more energy than the existing building. Additions shall be in accordance with Section R502.1.1 or R502.1.2.

R502.1.1 Prescriptive compliance. *Additions* shall comply with Sections R502.1.1.1 through R502.1.1.4.

R502.1.1.1 Building envelope. New building envelope assemblies that are part of the addition shall comply with Sections R402.1, R402.2, R402.3.1 through R402.3.5, and R402.4.

Exception: Where nonconditioned space is changed to conditioned space, the building envelope of the addition shall comply where the UA, as determined in Section R402.1.4, of the existing building and the addition, and any alterations that are part of the project, is less than or equal to the UA generated for the existing building.

R502.1.1.2 Heating and cooling systems. New heating, cooling and duct systems that are part of the addition shall comply with Section R403.

Exception: The following need not comply with the testing requirements of Section R403.3.3:

1. Additions of less than 750 square feet.
2. Duct systems that are documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in WSU RS-33.
3. Ducts with less than 40 linear feet in unconditioned spaces.
4. Existing duct systems constructed, insulated or sealed with asbestos.

R502.1.1.3 Service hot water systems. New service hot water systems that are part of the *addition* shall comply with Section R403.5.

R502.1.1.4 Lighting. New lighting systems that are part of the addition shall comply with Section 404.1.

R502.1.2 Existing plus addition compliance (Simulated Performance Alternative). Where nonconditioned space is changed to conditioned space the addition shall comply where the annual energy use of the addition and the existing building, and any alterations that are part of the project, is less than or equal to the annual energy use of the existing building when modeled in accordance with Section R405. The addition and any alterations that are part of the project shall comply with Section R405 in its entirety.

SECTION R503
ALTERATIONS

SDCI Informative Note: For landmark buildings, see Section R101.6.

R503.1 General. *Alterations* to any building or structure shall comply with the requirements of the code for new construction. *Alterations* shall be such that the existing building or structure is no less conforming to the provisions of this code than the existing building or structure was prior to the *alteration.*

Alterations to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. Alterations shall not create an unsafe or hazardous condition or overload existing building systems.

Alterations shall be such that the existing building or structure uses no more energy than the existing building or structure prior to the *alteration.* Alterations to existing buildings shall comply with Section R503.1.1 through R503.2.

The code official may approve designs of alterations which do not fully conform to all of the requirements of this code where in the opinion of the building official full compliance is physically impossible and/or economically impractical and:

1. The alteration improves the energy efficiency of the building; or
2. The alteration is energy efficient and is necessary for the health, safety, and welfare of the general public.

R503.1.1 Building envelope. Building envelope assemblies that are part of the alteration shall comply with Section R402.1.1 or R402.1.4, Sections R402.2.1 through R402.2.11, R402.3.1, R402.3.2, R402.4.3 and R402.4.4.

Exception: The following alterations need not comply with the requirements for new construction provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation. 2x4 framed walls shall be insulated to a minimum of R-15 and 2x6 framed walls shall be insulated to a minimum of R-21.
3. Construction where the existing roof, wall or floor cavity is not exposed.

TABLE A102.2.6(1)
ASSEMBLY U-FACTORS FOR ROOFS WITH TAPERED INSULATION ENTIRELY ABOVE DECK
SINGLE SLOPE RECTANGULAR TO ONE-SIDE((~~d,f,g,h,i~~)) a,d,g,h,i,j
(UNINTERRUPTED BY FRAMING)

Rated R-value of Insulation at Minimum Condition (Rmin[1])	Rated R-Value of Insulation at Maximum Condition (Rmax[1])												
	1	5	10	15	20	25	30	35	40	45	50	55	60
1	0.562	0.306	0.213	0.168	0.140	0.121	0.107	0.097	0.088	0.081	0.075	0.070	0.066
5	-	0.173	0.125	0.101	0.086	0.076	0.068	0.062	0.057	0.053	0.049	0.046	0.044
10	-	-	0.093	0.076	0.066	0.058	0.053	0.048	0.045	0.042	0.039	0.037	0.035
15	-	-	-	0.063	0.055	0.049	0.045	0.041	0.038	0.036	0.034	0.032	0.030
20	-	-	-	-	0.048	0.043	0.039	0.036	0.034	0.032	0.030	0.028	0.027
25	-				-	0.039	0.035	0.033	0.031	0.029	0.027	0.026	0.025
30					-	-	0.032	0.030	0.028	0.026	0.025	0.024	0.023
35					-	-	-	0.028	0.026	0.025	0.023	0.022	0.021
40					-	-	-	-	0.025	0.023	0.022	0.021	0.020
45					-	-	-	-	-	0.022	0.021	0.020	0.019
50					-	-	-	-	-	-	0.020	0.019	0.018
55					-	-	-	-	-	-	-	0.018	0.017
60	-	-	-	-	-	-	-	-	-	-	-	-	0.016

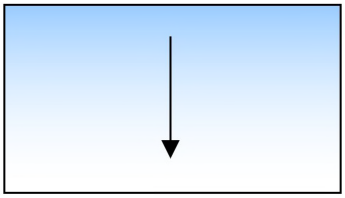


TABLE A102.2.6(2)
ASSEMBLY U-FACTORS FOR ROOFS WITH TAPERED INSULATION ENTIRELY ABOVE DECK
SLOPED TRIANGLE (ROOF WITH CENTER DRAIN)((~~e,f,g,h,i~~)) a,b,e,g,h,i,j
(UNINTERRUPTED BY FRAMING)

Rated R-value of Insulation at Minimum Condition (Rmin[2])	Rated R-Value of Insulation at Maximum Condition (Rmax[2])												
	1	5	10	15	20	25	30	35	40	45	50	55	60
1	0.562	0.242	0.146	0.106	0.083	0.068	0.058	0.051	0.045	0.040	0.036	0.033	0.031
5	-	0.173	0.112	0.084	0.068	0.057	0.049	0.044	0.039	0.035	0.032	0.030	0.028
10	-	-	0.093	0.071	0.059	0.050	0.044	0.039	0.035	0.032	0.029	0.027	0.025
15	-	-	-	0.063	0.053	0.045	0.040	0.035	0.032	0.029	0.027	0.025	0.023
20	-			-	0.048	0.042	0.037	0.033	0.030	0.027	0.025	0.024	0.022
25				-	-	0.039	0.034	0.031	0.028	0.026	0.024	0.022	0.021
30				-	-	-	0.032	0.029	0.027	0.025	0.023	0.021	0.020
35				-	-	-	-	0.028	0.026	0.024	0.022	0.021	0.019
40				-	-	-	-	-	0.025	0.023	0.021	0.020	0.019
45				-	-	-	-	-	-	0.022	0.020	0.019	0.018
50				-	-	-	-	-	-	-	0.020	0.018	0.017
55				-	-	-	-	-	-	-	-	0.018	0.017
60	-	-	-	-	-	-	-	-	-	-	-	-	0.016

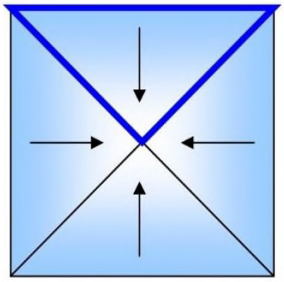
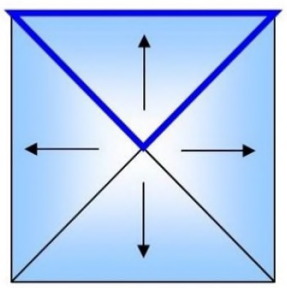


TABLE A102.2.6(3)
ASSEMBLY U-FACTORS FOR ROOFS WITH TAPERED INSULATION ENTIRELY ABOVE DECK
SLOPED TRIANGLE (ROOF WITH PERIMETER DRAINS)((~~e,f,g,h,i~~)) a,c,f,g,h,i,j
(UNINTERRUPTED BY FRAMING)

		Rated R-Value of Insulation at Maximum Condition (Rmax[3])												
		1	5	10	15	20	25	30	35	40	45	50	55	60
Rated R-value of Insulation at Minimum Condition (Rmin[2])	1	0.562	0.363	0.273	0.224	0.193	0.170	0.153	0.139	0.128	0.119	0.111	0.105	0.099
	5	-	0.173	0.138	0.118	0.104	0.094	0.086	0.079	0.074	0.070	0.066	0.062	0.059
	10	-	-	0.093	0.081	0.073	0.067	0.062	0.058	0.054	0.051	0.049	0.046	0.044
	15	-	-	-	0.063	0.058	0.053	0.050	0.047	0.044	0.042	0.040	0.038	0.037
	20	-			-	0.048	0.045	0.042	0.040	0.037	0.036	0.034	0.033	0.032
	25				-	-	0.039	0.037	0.035	0.033	0.031	0.030	0.029	0.028
	30				-	-	-	0.032	0.031	0.029	0.028	0.027	0.026	0.025
	35				-	-	-	-	0.028	0.027	0.026	0.025	0.024	0.023
	40				-	-	-	-	-	0.025	0.024	0.023	0.022	0.021
	45				-	-	-	-	-	-	0.022	0.021	0.020	0.020
	50				-	-	-	-	-	-	-	0.020	0.019	0.019
	55				-	-	-	-	-	-	-	-	0.018	0.017
	60				-	-	-	-	-	-	-	-	-	0.016



Footnotes to Tables A102.2.6.1, A102.2.6.2, and A102.2.6.3:

a. Rmax and Rmin are determined along the linearly tapered cross section for the respective ((~~minimum and~~)) maximum and minimum thickness values for the roof section being analyzed.

b. For triangular roof sections with insulation sloping to the center, Rmax refers to the insulation value along the long edge of the triangle and Rmin to the insulation at the point of the triangle. ((~~which assumes that the insulation slopes to the center.~~))

c. For triangular roof sections with insulation sloping to the perimeter, Rmax refers to the insulation value at the point of the triangle and Rmin to the insulation along the long edge of the triangle which assumes that the insulation slopes to the perimeter.

d. Effective ((~~U-factor for~~)) R-value of rectangular tapered insulation is calculated as follows:

$$R_{eff} = (R_{max} - R_{min}) / \ln \frac{R_{max}}{R_{min}}$$

e. Effective ((~~U-factor for~~)) R-value of triangular tapered insulation sloping to the center is calculated as follows:

$$R_{eff} = \left[\frac{2}{R_{max} - R_{min}} \left[1 + \frac{R_{min}}{R_{max} - R_{min}} \ln \left[\frac{R_{min}}{R_{max}} \right] \right] \right]^{-1}$$

f. Effective R-value of triangular tapered insulation sloping to the perimeter is calculated as follows:

$$R_{eff} = \left[\frac{2}{R_{min} - R_{max}} \left[1 + \frac{R_{max}}{R_{min} - R_{max}} \ln \left[\frac{R_{max}}{R_{min}} \right] \right] \right]^{-1}$$

((~~f~~)) g. Assembly U-factors include the effective R-value of the tapered insulation, an exterior air film (R=0.17) and an interior air film, horizontal with heat flow up (R=0.61).

((~~g~~)) h. For effective U-factors of roof assemblies with different Rmax or Rmin values not listed in the tables interpolation is allowed. For effective U-factors of roof assemblies with Rmax greater than the values listed in the tables, the effective U-factor must be calculated using the effective R-value calculations above.

((~~h~~)) i. This table shall only be applied to tapered insulation that is tapered along only one axis.

((~~i~~)) j. In areas of differing insulation slopes/configurations, individual ((~~U-values~~)) U-factors shall be calculated and an area weighted ((~~U-value~~)) U-factor calculation shall be used to determine the effective value of the roof.

SECTION A103
ABOVE GRADE WALLS

A103.1 General. The tables in this section list heat loss coefficients for the opaque portion of above-grade wood stud frame walls, metal stud frame walls and concrete masonry walls (Btu/h x ft^2 x °F) respectively. They are derived from procedures listed in the ASHRAE Fundamentals Handbook. For intermediate floor slabs which penetrate the insulated wall, use the concrete ((~~wall~~)) peripheral edge U-factors in Table A103.3.7.2.

Insulation is assumed to uniformly fill the entire cavity and to be installed as per manufacturer's directions. All walls are assumed to be finished on the inside with 1/2 inch gypsum wallboard, and on the outside with either beveled wood siding over 1/2 inch plywood sheathing or with 5/8 inch T1-11 siding. Insulated sheathing (either interior or exterior) is assumed to cover the entire opaque wall surface, except where modified in accordance with footnote g to Table C402.1.3.

APPENDIX D

CALCULATION OF HVAC TOTAL SYSTEM PERFORMANCE RATIO

D101 Scope. This appendix establishes criteria for demonstrating compliance using the *HVAC total system performance ratio* (HVAC TSPR) for systems serving office, retail, library, and education occupancies and buildings, which are subject to the requirements of Section C403.3.5 without exception and *dwelling units* and common areas within multifamily buildings. Those HVAC systems shall comply with Section C403 and this appendix as required by Section C403.1.1.

D201 Compliance. Compliance based on *HVAC total system performance ratio* requires that the provisions of Section C403.3 are met and the *HVAC total system performance ratio* of the *proposed design* is more than or equal to the *HVAC total system performance ratio* of the standard reference design. The *HVAC TSPR* is calculated according to the following formula:

HVAC TSPR = annual heating and cooling load/annual carbon emissions from energy consumption of the building HVAC systems

Where:

Annual carbon emissions from energy consumption of the building HVAC systems	=	sum of the annual carbon emissions in pounds for heating, cooling, fans, energy recovery, pumps, and heat rejection calculated by multiplying site energy consumption by the carbon emission factors from Table C407.1
Annual heating and cooling load	=	sum of the annual heating and cooling loads met by the building HVAC system in thousands of Btus.

TABLE C407.1
CARBON EMISSIONS FACTORS

Type	CO2e (lb/unit)	Unit
Electricity	0.70	kWh
Natural gas	11.70	Therm
Oil	19.2	Gallon
Propane	10.5	Gallon
Other[a]	195.00	mmBtu
On-site renewable energy[b]	0.00	

a. District energy systems may use alternative emissions factors supported by calculations approved by the *code official.*
b. The TSPR calculation does not separately account for the use of renewable energy.

D300 Simulation Program

D301 General.

D302 Calculation of the HVAC TSPR for the *Standard Reference Design*. The simulation program shall calculate the HVAC TSPR based only on the input for the *proposed design* and the requirements of this appendix. The calculation procedure shall not allow the user to directly modify the building component characteristics of the *standard reference design.*

D303 Specific approval. Performance analysis tools meeting the applicable subsections of Appendix D and tested according to ASHRAE Standard 140 shall be permitted to be *approved*. Tools are permitted to be *approved* based on meeting a specified threshold for a jurisdiction. The *code official* shall be permitted to approve tools for a specified application or limited scope.

D400 Climatic data. The simulation program shall perform the simulation using hourly values of climatic data, such as temperature and humidity, using TMY3 data for the site as specified here:

https://buildingenergyscore.energy.gov/resources

D500 Documentation. Documentation conforming to the provisions of this section shall be provided to the *code official.*

D501 Compliance report. Building permit submittals shall include:

1. A report produced by the simulation software that includes the following:
   - 1.1. Address of the building.
   - 1.2. Name of individual completing the compliance report.
   - 1.3. Name and version of the compliance software tool.
   - 1.4. The dimensions, floor heights and number of floors for each *block.*
   - 1.5. By *block*, the U-factor, C-factor, or F-factor for each simulated opaque envelope component and the U-factor and SHGC for each fenestration component.

D601.2.1 Number of blocks. One or more *blocks* may be required per building based on the following restrictions:

1. Each *block* can have only one occupancy type (multifamily *dwelling unit*, multifamily common area, office, library, education, or retail). Therefore, at least one single *block* shall be created for each unique use type.
2. Each *block* can be served by only one type of HVAC system. Therefore, a single *block* shall be created for each unique HVAC system and use type combination. Multiple HVAC units of the same type may be represented in one *block*. Table D601.10.2 provides directions for combining multiple HVAC units or components of the same type into a single *block*.
3. Each *block* can have a single definition of floor to floor or floor to ceiling heights. Where floor heights differ by more than two feet, unique *blocks* should be created for the floors with varying heights.
4. Each *block* can include either above grade or below grade floors. For buildings with both above grade and below grade floors, separate *blocks* should be created for each. For buildings with floors partially above grade and partially below grade, if the total wall area of the floor(s) in consideration is greater than or equal to 50 percent above grade, then it should be simulated as a completely above grade *block*, otherwise it should be simulated as a below grade *block*.
5. Each wall on a façade of a *block* shall have similar vertical fenestration. The product of the proposed design U-factor times the area of windows (UA) on each façade of a given floor cannot differ by more than 15 percent of the average UA for that façade in each *block*. The product of the proposed design SHGC times the area of windows (USHGC) on each façade of a given floor cannot differ by more than 15 percent of the average USHGC for that façade in each *block*. If either of these conditions are not met, additional *blocks* shall be created consisting of floors with similar fenestration.
6. For a building model with multiple *blocks*, the *blocks* should be configured together to have the same adjacencies as the actual building design.

D601.3 Thermal zoning. Each floor in a *block* shall be modeled as a single thermal zone or as five thermal zones consisting of four perimeter zones and a core zone. Below grade floors shall be modeled as a single thermal *block*. If any façade in the block is less than 45 feet in length, there shall only be a single thermal zone per floor. Otherwise each floor shall be modeled with five thermal zones. A perimeter zone shall be created extending from each façade to a depth of 15 feet. Where facades intersect, the zone boundary shall be formed by a 45 degree angle with the two facades. The remaining area or each floor shall be modeled as a core zone with no exterior walls.

D601.4 Occupancy.

D601.4.1 Occupancy type. The occupancy type for each *block* shall be consistent with the building area type as determined in accordance with C405.4.2.1. Portions of the building that are building area types other than multifamily, office, school (education), library, or retail shall not be not be included in the simulation.

D601.4.2 Occupancy schedule, density, and heat gain. The occupant density, heat gain, and schedule shall be for multifamily, office, retail, library, or school as specified by ASHRAE Standard 90.1 Normative Appendix C.

D601.5 Envelope components.

D601.5.1 Roofs. Roofs will be modeled with insulation above a steel roof deck. The roof U-factor and area shall be modeled as in the proposed design. If different roof thermal properties are present in a single block, an area weighted U-factor shall be used. Roof solar absorbtance shall be modeled at 0.70 and emittance at 0.90.

D601.5.2 Above grade walls. Walls will be modeled as steel frame construction. The U-factor and area of above grade walls shall be modeled as in the proposed design. If different wall constructions exist on the façade of a block an area-weighted U-factor shall be used.

D601.5.3 Below grade walls. The C-factor and area of below grade walls shall be modeled as in the proposed design. If different slab on grade floor constructions exist in a block, an area-weighted C-factor shall be used.

D601.5.4 Above grade exterior floors. Exterior floors shall be modeled as steel frame. The U-factor and area of floors shall be modeled as in the proposed design. If different wall constructions exist in the block an area-weighted U-factor shall be used.

D601.5.5 Slab on grade floors. The F-factor and area of slab on grade floors shall be modeled as in the proposed design. If different below grade wall constructions exist in a block, an area-weighted F-factor shall be used.

D601.5.6 Vertical fenestration. The window area and area weighted U-factor and SHGC shall be modeled for each façade based the proposed design. Each exterior surface in a block must comply with Section D601.2.1 item 5. Windows will be combined in to a single window centered on each façade based on the area and sill height input by the user.

D601.5.7 Skylights. The skylight area and area weighted U-factor and SHGC shall be modeled for each floor based the proposed design. Skylights will be combined in to a single skylight centered on the roof of each zone based on the area and sill height input by the user.

D601.6 Lighting. Interior lighting power density shall be equal to the allowance in Table C405.4.2(1) for multifamily, office, retail, library, or school. The lighting schedule shall be for multifamily, office, retail, library, or school as specified by

ASHRAE Standard 90.1 Normative Appendix C. The impact of lighting controls is assumed to be captured by the lighting schedule and no explicit controls shall be modeled. Exterior lighting shall not be modeled.

D601.7 Miscellaneous equipment. The miscellaneous equipment schedule and power shall be for multifamily, office, retail, library, or school as specified by ASHRAE Standard 90.1 Normative Appendix C. The impact of miscellaneous equipment controls is assumed to be captured by the equipment schedule and no explicit controls shall be modeled.

Exceptions:

1. Multifamily dwelling units shall have a miscellaneous load density of 0.42 W/ft^2
2. Multifamily common areas shall have a miscellaneous load density of 0 W/ft^2

D601.8 Elevators. Elevators shall not be modeled.

601.9 Service water heating equipment. Service water heating shall not be modeled.

D601.10 On-site renewable energy systems. On-site Renewable Energy Systems shall not be modeled.

D601.11 HVAC equipment. HVAC systems shall meet the requirements of Section C403 Mechanical Systems.

D601.11.1 Supported HVAC systems. At a minimum, the HVAC systems shown in Table D601.11.1 shall be supported by the simulation program.

Table D601.11.1
PROPOSED BUILDING HVAC SYSTEMS SUPPORTED BY HVAC TSPR SIMULATION SOFTWARE

System No.	System Name	System Abbreviation
1	Packaged Terminal Air Conditioner	PTAC
2	Packaged Terminal Air Heat Pump	PTHP
3	Packaged Single Zone Gas Furnace	PSZGF
4	Packaged Single Zone Heat Pump (air to air only)	PSZHP
5	Variable Refrigerant Flow (air cooled only)	VRF
6	Four Pipe Fan Coil	FPFC
7	Water Source Heat Pump	WSHP
8	Ground Source Heat Pump	GSHP
9	Packaged Variable Air Volume (DX cooling)	PVAV
10	Variable Air Volume (hydronic cooling)	VAV
11	Variable Air Volume with Fan Powered Terminal Units	VAVFPTU
12	Dedicated Outdoor Air System (in conjunction with systems 1-8)	DOAS

D601.11.2 Proposed building HVAC system simulation. The HVAC systems shall be modeled as in the proposed design with clarifications and simplifications as described in Table D601.11.2. System parameters not described in the following sections shall be simulated to meet the minimum requirements of Section C403. All zones within a block shall be served by the same HVAC system type as described in Section D601.2.1 item 2. Where multiple system components serve a block, average values weighed by the appropriate metric as described in this section shall be used. Heat loss from ducts and pipes shall not be modeled.

Exception: Where the building permit applies to only a portion of an HVAC system and remaining components will be designed under a future building permit, the future components shall be modeled to meet, but not exceed, the requirements of Section C403.

TABLE D601.11.2
PROPOSED BUILDING SYSTEM PARAMETERS

Category	Parameter	Fixed or User Defined	Required	Applicable Systems
HVAC System Type	System Type	User Defined	Selected from Table D601.11.1	All
System Sizing	Design Day Information	Fixed	99.6% heating design and 1% dry-bulb and 1% wet-bulb cooling design	All
	Zone Coil Capacity	Fixed	Sizing factors used are 1.25 for heating equipment and 1.15 for cooling equipment	All
	Supply Airflow	Fixed	Based on a supply-air-to-room-air temperature *set-point* difference of 20°F	1-11
		Fixed	Equal to required outdoor air ventilation	12

TABLE D601.11.2—continued
PROPOSED BUILDING SYSTEM PARAMETERS

Category	Parameter	Fixed or User Defined	Required	Applicable Systems
Outdoor Ventilation Air	Outdoor Ventilation Air Flow Rate	Fixed	As specified in ASHRAE Standard 90.1 Normative Appendix C, adjusted for proposed DCV control	All
System Operation	Space temperature Set points	Fixed	As specified in ASHRAE Standard 90.1 Normative Appendix C, except multifamily which shall use 68°F heating and 76°F cooling setpoints	1-11
	Fan Operation – Occupied	User Defined	Runs continuously during occupied hours or cycled to meet load	1-11
	Fan Operation – Occupied	Fixed	Fan runs continuously during occupied hours	12
	Fan Operation – Night Cycle	Fixed	Fan cycles on to meet setback temperatures	1-11
Packaged Equipment Efficiency	DX Cooling Efficiency	User Defined	Cooling COP without fan energy calculated in accordance with ASHRAE Standard 90.1 Section 11.5.2c.[b]	1, 2, 3, 4, 5, 7, 8, 9, 11, 12
	Heat Pump Efficiency	User Defined	Heating COP without fan energy calculated in accordance with ASHRAE Standard 90.1 Section 11.5.2c.[c]	2, 4, 5, 7, 8
	Furnace Efficiency	User Defined	Furnace thermal efficiency[c]	3, 11
Heat Pump Supplemental Heat	Control	Fixed	Supplemental electric heat locked out above 40°F. Runs In conjunction with compressor between 40°F and 0°F.	2, 4
System Fan Power	Design Fan Power (W/cfm)	User Defined	Input electric power for all fans in required to operate at *fan system design conditions* divided by the supply airflow rate	All
	Single Zone System Fan Power During Dead band (W/cfm)	User Defined	W/cfm during dead band for VAV or multispeed single zone fans	3, 4, 5, 6, 7, 8
Variable Air Volume Systems	Part Load Fan Controls	User Defined	VFD included. User specifies presence of static pressure reset.	9, 10, 11
	Supply Air Temperature Controls	User defined	If not SAT reset constant at 55°F. SAT reset results in 60°F SAT during low load conditions	9, 10, 11
	Minimum Terminal Unit airflow percentage	User Defined	Average minimum terminal unit airflow percentage for *block* weighted by cfm	9, 10, 11
	Terminal Unit Heating Source	User Defined	Electric or hydronic	9, 10, 11
	Fan Powered Terminal Unit (FPTU) Type	User Defined	Series or parallel FPTU	11
	Parallel FPTU Fan	Fixed	Sized for 50% peak primary air at 0.35 W/cfm	11
	Series FPTU Fan	Fixed	Sized for 50% peak primary air at 0.35 W/cfm	11
Economizer	Economizer Presence	User Defined	Yes or No	3, 4, 9, 10, 11
	Economizer ((~~High Limit~~)) Control Type	Fixed	((~~75°F fixed~~)) Differential dry-bulb	3, 4, 9, 10, 11
Energy Recovery	Sensible Effectiveness	User Defined	Heat exchanger sensible effectiveness at design heating and cooling conditions	3, 4, 9, 10, 11, 12
	Latent Effectiveness	User Defined	Heat exchanger latent effectiveness at design heating and cooling conditions	3, 4, 9, 10, 11, 12
	Economizer Bypass	User Defined	If ERV is bypassed during economizer conditions	3, 4, 9, 10, 11, 12
	Energy Recovery Temp Control	User Defined	If bypass, target supply air temperature	3, 4, 9, 10, 11, 12
	Fan Power Reduction during Bypass (W/cfm)	User Defined	If ERV system include bypass, static pressure set point and variable speed fan, fan power can be reduced during economizer conditions	3, 4, 9, 10, 11, 12
Demand Controlled Ventilation	DCV Application	User Defined	Percent of block floor area under DCV control	3, 4, 9, 10, 11, 12

TABLE D601.11.2—continued
PROPOSED BUILDING SYSTEM PARAMETERS

Category	Parameter	Fixed or User Defined	Required	Applicable Systems
DOAS	DOAS Fan Power W/cfm	User Defined	Fan input power in W/cfm of supply airflow[a]	12
	DOAS Supplemental Heating and Cooling	User Defined	Heating source, cooling source	12
	DOAS Supply Air Temperature Control	User Defined	SAT set point if DOAS includes supplemental heating or cooling and active temperature controls	12
Heating Plant	Boiler Efficiency[d]	User Defined	Boiler thermal efficiency	1, 6, 7, 9, 10, 11, 12
	Heating Water Pump Power (W/gpm)	User Defined	Pump input W/gpm heating water flow	1, 6, 7, 9, 10, 11, 12
	Heating Water Loop Temperature	Fixed	180°F supply, 130°F return	1, 6, 9, 10,11
Chilled Water Plant	Chiller Compressor Type	User Defined	Screw/Scroll, Centrifugal or Reciprocating	6,1 0, 11, 12
	Chiller Condenser Type	User Defined	Air cooled or water cooled	6, 10, 11, 12
	Chiller Full Load Efficiency[d]	User Defined	Chiller COP	6, 10, 11, 12
	Chilled Water loop Configuration	User Defined	Variable flow primary only, constant flow primary – variable flow secondary	6, 10, 11, 12
	Chilled Water Pump Power (W/gpm)	User Defined	Pump input W/gpm chilled water flow	6, 10, 11, 12
	Chilled Water Temperature Reset Included	User Defined	Yes/No	6, 10, 11, 12
	Chilled Water Temperature Reset Schedule (if included)	Fixed	Outdoor air reset: CHW supply temperature of 44°F at 80°F outdoor air dry bulb and above, CHW supply temperature of 54°F at 60°F outdoor air dry bulb temperature and below, ramped linearly between	6, 10, 11, 12
	Condenser Water Pump Power (W/gpm)	User Defined	Pump input W/gpm condenser water flow	6, 7, 8, 9, 10, 11, 12
	Condenser Water Pump Control	User Defined	Constant speed or variable speed	6, 7, 10, 11, 12
	Cooling Tower Efficiency	User Defined	gpm/hp tower fan	6, 10, 11, 12
Cooling Tower	Cooling Tower Fan Control	User Defined	Constant or variable speed	6, 10, 11, 12
	Cooling Tower Approach and Range	User Defined	Design cooling tower approach and range temperature	6, 10, 11, 12
Heat Pump Loop Flow Control	Loop flow and Heat Pump Control Valve	Fixed	Two position Valve with VFD on Pump. Loop flow at 3 gpm/ton	7, 8
Heat Pump Loop Temperature Control		Fixed	Set to maintain temperature between 50°F and 70°F	7
GLHP Well Field		Fixed	Bore depth = 250'	8
			Bore length 200'/ton for greater of cooling or heating load	
			Bore spacing = 15'	
			Bore diameter = 5"	
			3/4" Polyethylene pipe	
			Ground and grout conductivity =	
			4.8 Btu-in/h-ft^2-°F	

a. Where multiple fan systems serve a single block, fan power is based on weighted average using on supply air cfm.
b. Where multiple cooling systems serve a single block, COP is based on a weighted average using cooling capacity.
c. Where multiple heating systems serve a single block, thermal efficiency or heating COP is based on a weighted average using heating capacity.
d. Where multiple boilers or chillers serve a heating water or chilled water loop, efficiency is based on a weighted average for using heating or cooling capacity.

D602 Simulation of the standard reference design. The *standard reference design* shall be configured and analyzed as specified in this section.

D602.1 Utility rates. Same as proposed.

D602.2 Blocks. Same as proposed.

D602.3 Thermal zoning. Same as proposed.

D602.4 Occupancy type, schedule, density, and heat gain. Same as proposed.

D602.5 Envelope components. Same as proposed.

D602.6 Lighting. Same as proposed.

D602.7 Miscellaneous equipment. Same as proposed.

D602.8 Elevators. Not modeled. Same as proposed.

D602.9 Service water heating equipment. Not modeled. Same as proposed.

D602.10 On-site renewable energy systems. Not modeled. Same as proposed.

D602.11 HVAC equipment. The *standard reference design* HVAC equipment consists of separate space conditioning systems and dedicated outside air systems as described in Table D602.11 for the appropriate building occupancies.

TABLE D602.11
STANDARD REFERENCE DESIGN HVAC SYSTEMS

Parameter	Building Type				
	Large Office[a]	Small Office and Libraries[a]	Retail	School	Multifamily
System Type	Water-source Heat Pump	Packaged air-source Heat Pump	Packaged air-source Heat Pump	Packaged air-source Heat Pump	Packaged air-source Heat Pump
Fan control[b]	Cycle on load	Cycle on load	Cycle on load	Cycle on load	Cycle on load
Space condition fan power (W/cfm)	0.528	0.528	0.522	0.528	0.528
Heating/Cooling sizing factor[c]	1.25/1.15	1.25/1.15	1.25/1.15	1.25/1.15	1.25/1.15
Supplemental heating availability	NA	<40°F	<40°F	<40°F	<40°F
Modeled cooling COP (Net of fan)[d]	4.46	3.83	4.25	3.83	3.83
Modeled heating COP (Net of fan)[d]	4.61	3.81	3.57	3.81	3.86
Cooling Source	DX (heat pump)	DX (heat pump)	DX (heat pump)	DX (heat pump)	DX (heat pump)
Heat source	Heat Pump	Heat Pump	Heat Pump	Heat Pump	Heat Pump
OSA Economizer[e]	No	No	Yes	Yes	Yes
Occupied ventilation source[f]	DOAS	DOAS	DOAS	DOAS	DOAS
DOAS Fan Power (W/cfm of outside air)	0.819	0.819	0.730	0.742	0.78
DOAS temperature control[g, h]	Bypass	Wild	Bypass	Bypass	Wild
ERV efficiency (sensible only)	70%	70%	70%	70%	70%
WSHP Loop Heat Rejection	Cooling Tower[i]	NA	NA	NA	NA
WSHP Loop Heat Source	Gas Boiler[j]	NA	NA	NA	NA
WSHP Loop Temperature Control[k]	50°F to 70°F	NA	NA	NA	NA
WSHP circulation Pump W/gpm[l]	16	NA	NA	NA	NA
WSHP Loop Pumping Control[m]	HP Valves & pump VSD	NA	NA	NA	NA

a. Offices <50,000 ft^2 use "Small Office" parameters; otherwise use "Large Office" parameters.

b. Space conditioning system shall cycle on to meet heating and cooling set point schedules as specified in ASHRAE Standard 90.1 Normative Appendix C. One space conditioning system is modeled in each zone. Conditioning system fan operation is not necessary for ventilation delivery.

c. The equipment capacities (i.e. system coil capacities) for the *standard reference design* building design shall be based on design day sizing runs and shall be oversized by 15% for cooling and 25% for heating.

d. COPs shown are direct heating or cooling performance and do not include fan energy use. See 90.1 appendix G (G3.1.2.1) for separation of fan from COP in packaged equipment for units where the efficiency rating includes fan energy (e.g., SEER, EER, HSPF, COP).

e. Economizer on space conditioning systems shall be simulated when outdoor air conditions allow free cooling. Economizer high limit shall be based on differential dry-bulb control. DOAS system continues to operate during economizer mode.

f. Airflow equal to the outside air ventilation requirements is supplied and exhausted through a separate DOAS system including a supply fan, exhaust fan, and sensible only heat exchanger. No additional heating or cooling shall be provided by the DOAS. A single DOAS system will be provided for each *block*. The DOAS supply and return fans shall run whenever the HVAC system is scheduled to operate in accordance with ASHRAE Standard 90.1 Normative Appendix C.

g. "Wild" DOAS control indicates no active control of the supply air temperature leaving the DOAS system. Temperature will fluctuate based only on entering and leaving conditions and the effectiveness of ERV.

h. "Bypass" DOAS control includes modulating dampers to bypass ERV with the intent to maintain supply air temperature at a maximum of 60°F when outside air is below 75°F. Once outside air is above 75°F bypass dampers will be fully closed.
i. Includes a single axial fan cooling tower with variable-speed fans at 40.2 gpm/hp, sized for an approach of 10°F and a range of 10°F.
j. Includes a single natural draft boiler with 80% E_t.
k. Loop boiler and heat rejection shall be controlled to maintain loop temperature entering heat pumps between 50°F and 70°F.
l. Pump motor input power shall be 16 W/gpm.
m. Loop flow shall be variable with variable speed drive pump and unit fluid flow shutoff at each heat pump when its compressor cycles off.

SUMMARY and FISCAL NOTE*

Department:	Dept. Contact/Phone:	CBO Contact/Phone:
SDCI	Duane Jonlin 206-233-2781	Christie Parker 206-684-5211

** Note that the Summary and Fiscal Note describes the version of the bill or resolution as introduced; final legislation including amendments may not be fully described.*

1. BILL SUMMARY

Legislation Title: AN ORDINANCE relating to Seattle's construction codes; adopting the Seattle Energy Code and chapters of the Washington Administrative Code by reference and amending certain chapters of the Code; amending Section 22.101.010 of the Seattle Municipal Code; repealing Title 22, Subtitle VII of the Seattle Municipal Code; and repealing Sections 2 through 10 of Ordinance 125159 and Section 5 of Ordinance 125410.

Summary and background of the Legislation: This legislation adopts the 2018 Seattle Energy Code, consisting of the 2018 International Energy Conservation Code with Washington state amendments and Seattle amendments**.** The Seattle amendments apply to multifamily buildings taller than three stories, and to all non-residential buildings, incrementally improving their building insulation, space heating, water heating, lighting, and renewable energy systems.
The items listed below comprise the most significant 2018 Seattle Energy Code amendments to the Washington State Energy Code. Each amendment is designed to reduce building energy use and carbon emissions, as required by state and City legislation.

These amendments apply to multifamily buildings taller than three stories and all commercial buildings (not to houses or low-rise multifamily), and improve the building insulation, space heating, water heating, lighting, and renewable energy. Implementation of the new space heating and water heating provisions will be delayed until January 1, 2022, while the remainder of the code is scheduled to go into effect March 15, 2021.

The rules apply to new construction, as well as to the alteration or replacement of existing building components.

1. Intent. Revise the code's "intent" section to include *reduction of carbon emissions*, in addition to energy efficiency.
2. Insulation integrity. Recognize heat loss of *through-wall mechanical equipment, concrete balconies, and window frames* when calculating insulating value of walls.
3. Fenestration. Require *improved thermal properties* of fenestration (10% - 15% less heat loss).
4. TSPR (the HVAC Total System Performance Ratio). Add *multifamily and medical office buildings* to list of buildings required to comply with TSPR. (Washington code lists office, education, library, and retail).
5. Heating system type. Formalize existing code *restrictions on electric resistance and fossil fuel space heating*, extend to multifamily buildings, delay implementation until January 2022. Many exceptions allowing small and special-purpose electric resistance heating.

6. HVAC controls. Add new control and efficiency provisions for ventilation and heat recovery. 60% energy recovery effectiveness, vs. 50% for Washington code.
7. Hot water circulation. Insulation, control, and efficiency improvements to hot water circulation.
8. Water heating system type. Restrict fossil fuel and electric resistance central water heating systems, typically in favor of *heat pump water heating*, in R-1 & R-2 buildings, delay implementation until January 2022.
9. Lighting in open office areas. Provide LLLC (luminaire-level lighting controls) or networked lighting control system for open office areas larger than 5,000 square feet.
10. Lighting power. Reduce interior LPAs (lighting power allowances) 10% below state code levels.
11. Future electrification of appliances. Provide electrical receptacles and circuits at dwelling unit gas-fired appliances, to accommodate future electric appliances.
12. Solar. Increase on-site solar photovoltaics from 0.07 W/sf of floor area to 0.25 W/sf, based on area of all floors.
13. Additional efficiency credits. Increase number of credits required from 6 to 8 credits
14. Target performance path (TPP) (rarely used). Set TPP targets as 12% above Washington state Building Performance Factor values, replacing the current list of target values.
15. Energy modeling & building envelope. Prohibit envelope heat loss more than 10% worse than allowed in the prescriptive code when using energy modeling for code compliance. (State code threshold allows 20% worse.)

2. CAPITAL IMPROVEMENT PROGRAM

Does this legislation create, fund, or amend a CIP Project? ___ **Yes** _X_ **No**

3. SUMMARY OF FINANCIAL IMPLICATIONS

Does this legislation amend the Adopted Budget? ___ **Yes** _X_ **No**

Does the legislation have other financial impacts to The City of Seattle that are not reflected in the above, including direct or indirect, short-term or long-term costs?
New facilities or significant alterations of City buildings will need to comply with the higher-performance requirements of the code as part of the permitting process. Energy bills for those impacted buildings will typically be reduced.

Is there financial cost or other impacts of *not* implementing the legislation?
Energy bills of City facilities would be higher. Future conversion of building systems to higher-efficiency, lower-carbon equipment would be expensive and disruptive.

4. OTHER IMPLICATIONS

a. Does this legislation affect any departments besides the originating department?
New facilities or significant alterations of buildings from any department will need to comply with the higher-performance requirements of the code as part of the permitting process. Utility bills for those impacted buildings will typically be reduced.

b. Is a public hearing required for this legislation?
No. Extensive public meetings, and reviews by the Construction Codes Advisory Board (CCAB), have taken place over the course of 2020.

c. Is publication of notice with *The Daily Journal of Commerce* and/or *The Seattle Times* required for this legislation?
No. However, a SEPA determination of non-significance was published in December 2020.

d. Does this legislation affect a piece of property?
No.

e. Please describe any perceived implication for the principles of the Race and Social Justice Initiative. Does this legislation impact vulnerable or historically disadvantaged communities? What is the Language Access plan for any communications to the public?
A Racial Equity Toolkit has been completed, and no impact on vulnerable or historically disadvantaged communities is anticipated. We have not encountered non-English speakers at the 2020 public meetings or CCAB meetings.

f. Climate Change Implications

1. **Emissions: Is this legislation likely to increase or decrease carbon emissions in a material way?**
   This legislation will significantly *decrease* carbon emissions from new and altered buildings in Seattle.
2. **Resiliency: Will the action(s) proposed by this legislation increase or decrease Seattle's resiliency (or ability to adapt) to climate change in a material way? If so, explain. If it is likely to decrease resiliency in a material way, describe what will or could be done to mitigate the effects.**
   This legislation will *increase* resiliency by reducing dependence on fossil fuels, by using electricity more efficiently, and by increasing distributed renewable energy.

g. If this legislation includes a new initiative or a major programmatic expansion: What are the specific long-term and measurable goal(s) of the program? How will this legislation help achieve the program's desired goal(s)?
This legislation is a continuation of a long-term strategy of the Seattle Climate Action Plan to reduce carbon pollution from buildings.

List attachments/exhibits below:
Summary Attachment A – Code Reviser's Statement on RCW 35.21.180

Code Reviser's Statement on RCW 35.21.180

RCW 35.21.180 allows cities to adopt by reference "any printed code or compilation," rather than listing the entire code in an ordinance, as long as a physical copy is filed "for use and examination by the public, in the office of the city or town clerk of said city, or town prior to adoption thereof." Given that "printed" has been the word used in this section and its predecessors since 1935, and given that RCW 35.21.530 and its predecessors have referred to municipal codes as requiring a "typewritten or printed copy" since 1957, the most sensible construction is that these state laws expect a physical book version of anything adopted by reference; linking to an electronic version alone would not satisfy these RCW requirements.

A physical book copy of the 2018 Washington State Energy Code will be filed prior to adoption to comply with RCW 35.21.180. However, COVID-19 restrictions on public spaces render it logistically impossible to, while the bill is being considered, make the filed book available "for use and examination by the public." In the interim, the 2018 Washington State Energy Code may be found at https://sbcc.wa.gov/state-codes-regulations-guidelines/state-building-code/energy-code.

The adopted book should be the same printing linked to above; however, initial electronic documents used to create the attachment to this ordinance came from earlier printings supplied to Seattle. Every effort has been made to update the initial file to current language. In the event of a discrepancy in unamended code language, the filed book will control.

Legislation Text

File #: CF 314461, **Version:** 1

Application of Martin Liebowitz and 34th and Spring, LLC for an extension of the contract rezone of the property at 1106 34th Avenue. Original contract rezone application approved through CF 314325 and Ordinance 125433.

The extension request is provided as an attachment.

To: Johnny Harris, SDCI

CC: Lish Whitson, Council Staff

From: Martin Liebowitz

Date: 6/30/2020

RE: EXTENSION NARRATIVE- for Rezone Extension

Request for Rezone Extension – CF 314325

I. Rezone History

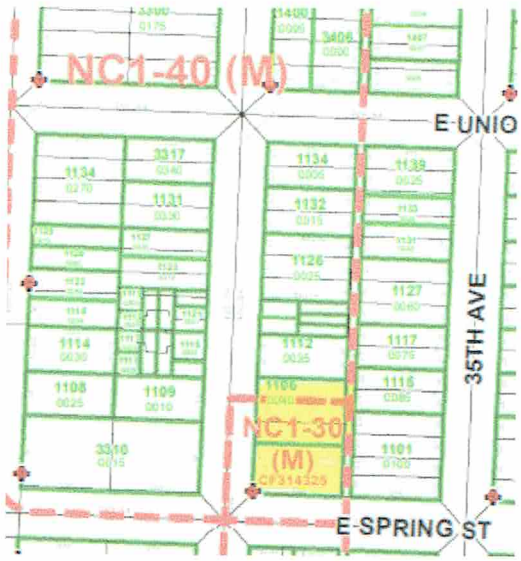
On October 9, 2017, the City Council voted to grant a contract rezone to Martin Liebowitz and 34th and Spring, LLC to rezone property located at 1106 34th Avenue from Lowrise 2 ("LR2") to Neighborhood Commercial 1 with a 30-foot height limit ("NC1-30"), which was consistent with immediately adjacent zoning. (*See* SDCI Project No. 3020405, Council File 314325, Council Bill 119091). The effective date for the City Council's action was 30 days later, on November 8, 2017. *See* CB 119091. The applicant executed a Property Use and Development Agreement ("PUDA") as a condition of the rezone approval, which was recorded in the real property records of King County under record number 2017111600748.

A condition of the PUDA is that development of the rezoned property shall be subject to the conditions of the City's Mandatory Housing Affordability program in SMC Chapters 23.58B and 23.58C. The rezone was given a "M" suffix. The requirements for compliance with SMC Chapter 23.58C listed in the PUDA is 6% of units or $13.25 per square foot. The PUDA did not specify the specific compliance requirements for SMC Chapter 23.58B.

Subsequently, the City completed the City-wide Mandatory Housing Affordability upzone, which up-zoned property adjacent to the 1106 34th Avenue property and a small sliver of the subject property to NC1-40 (M), but did not change the zoning designation on most of the subject property. It was the applicant's intention for the zoning on the 1106 34th Avenue

property to match adjacent zoning and for there to be no split-zoned condition, so it was disappointing the City did not further up-zone the subject property.

Here is a depiction of the current zoning designations that apply to the subject property:



II. Request for Rezone Extension

The applicant now seeks extension of the contract rezone pursuant to SMC 23.76.060.C and .E, which state that, except as otherwise provided in the Council decision on the contract rezone, the rezone shall expire three years after the date of the Council action unless the Council extends the rezone upon an applicant's filing an application at least 120 days before the approval's expiration. Here, because the City Council action specified that it was not effective until 30 days after approval of the City Council, the date of the "action" for the purposes of expiration is November 8, 2020. This application is being submitted prior to July 11, 2020, so it is submitted more than 120 days prior to rezone expiration.

The criteria the Council must consider in extending the rezone support this action. First, the rezone is in conformance with applicable regulations. *See* SMC 23.76.060.E.1. The PUDA requires compliance with the Mandatory Housing Affordability program and SMC Chapters 23.58B and 23.58C. This is in conformance with current rezone requirements. *See* SMC 23.34.004.B. A master use permit for new development will also be subject to the current land use code.

Second, there is good reason to support the extension. The applicant desires to move forward with a development project that takes advantage of the current zoning designation, but has been unable to find a development partner given the economic recession and uncertainty created by the COVID-19 pandemic. Further, changed circumstances in the area continue to support the rezone. The original rezone was to match adjacent NC1-30 zoning. Since then, the immediately

adjacent zoning was updated to NC1-40 (M), which is even more dense. To allow the rezone to expire and to revert to LR2 zoning would not be in keeping with the pattern of development intensity the City has established for the block.

Yours truly,

Martin Liebowitz

CITY OF SEATTLE
ANALYSIS AND RECOMMENATION OF THE DIRECTOR OF THE SEATTLE DEPARTMENT OF CONSTRUCTION AND INSPECTIONS

Record Number: 3036784-LU

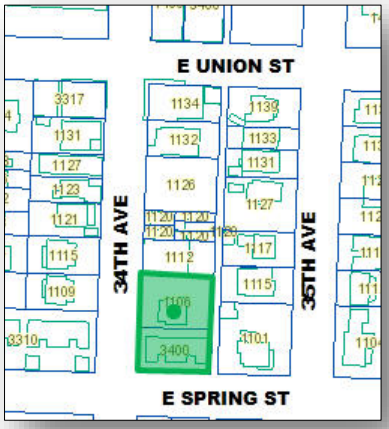
Council File Number: CF # 314461

Applicant Name: Martin Liebowitz

Address of Proposal: 1106 34th Ave

SUMMARY OF PROPOSED ACTION

Extension of original rezone request #3020405-LU. Council Land Use Action to rezone a 4,808 sq. ft. portion of land from LR2 (Lowrise 2) to NC1-30 (M) (Neighborhood Commercial 1 with 30-foot height limit) and a 6,109 sq. ft. parcel of land from LR2 (Lowrise 2) to NC1-30 (M) (Neighborhood Commercial with 30-foot height limit).



The following approvals are required:

Director's Determination on the requested Property Use and Development Agreement (PUDA) amendment — pursuant to Seattle Municipal Code (SMC) 23.76.058.C.

Council Land Use Action — to extend the expiration date established by the contract rezone pursuant to SMC 23.76.060.E.

SEPA DETERMINATION: [X] Exempt* [ ] DNS [ ] MDNS [ ] EIS

[ ] DNS with conditions

[ ] DNS involving non-exempt grading or demolition or involving another agency with jurisdiction.

*SEPA Determination was issued by SDCI under 302405-LU on June 5th 2017.

BACKGROUND INFORMATION

Martin Liebowitz submitted an application to the Department of Constructions and Inspections (SDCI), dated June 30th 2020, requesting an amendment to a Property Use and Development Agreement (PUDA) and for an extension of the contract rezone time limit at least 120 days before its expiration.

The City Council adopted Ordinance 125433, which granted the original contract rezone and accepted the associated Property Use and Development Agreement (PUDA). The ordinance was signed by Rob Johnson, President Pro Tem of the City Council, on October 9th 2017. The ordinance provided that the contract rezone designation would expire three years after the effective date of the ordinance. The PUDA, which Martin Liebowitz signed, was recorded with the King County Department of Elections and Records (2017111600748), includes a condition stating *"…that development of the rezoned property shall be subject to the conditions of the City's Mandatory Housing Affordability program in SMC Charters 23.58B and 23.58C. The rezone was given a "M" suffix. The requirements for compliance with SMC Chapter 23.58C listed the PUDA as 6% of units or $13.25 per square foot. The PUDA did not specify the specific compliance requirements for SMC Chapter 23.58B."*

Public Comments

SDCI issued notice of this application pursuant to 23.76.058.C.1-3. The required public comment period was July 16th 2020 through July 29th 2020. SDCI received eleven written comments. Comments against the extension focused on the amount of undeveloped commercial property available, the lack of smaller scale residential development in the area, inadequate vehicle parking available on the street, the negative impact of a large building on residential neighbors, and the amount of commercial/retail density that cannot be assimilated by the neighborhood. The comments also noted concern with the possibility of added traffic to the rights-of-way. Comments for the extension favored having additional commercial spaces and residential units developed in the area.

DIRECTOR'S ANALYSIS, DETERMINATION AND RECOMMENDATION

Martin Liebowitz requests a Property Use and Development Agreement (PUDA) amendment and an extension of the time limit on the Type IV land use decision.

PUDA AMENDMENT

SMC 23.76.058.C explains the procedures and general criteria for the Director to make a determination whether a requested amendment is considered major or minor. *Subsection 23.76.058.C.4 reads as follows:*

4. *The Director shall determine whether the amendment is major or minor. This determination is a Type I decision.*
    a. *Minor amendments. A minor amendment to a PUDA is one that is within the spirit and general purpose of the prior decision of the Council, is generally consistent with the uses and development standards approved in the prior decision of the Council, would not result in significant adverse impacts that were not anticipated in the prior decision of the Council, and does not request any additional waivers or changes in the waivers of bulk or off-street parking and loading requirements other than those approved in the prior decision of the Council. If the Director determines that a proposed amendment is minor, the Director shall transmit to Council the application to amend, the Director's*

determination that the proposed amendment is minor, any comments received by the Director on the proposed amendment, and the Director's recommendation on the proposed amendment. An application to amend that is minor and that complies with the rezone criteria of Chapter 23.34 may be approved by the Council by ordinance after receiving any additional advice that it deems necessary.

b. Major Amendments. Applications to amend a PUDA that are not minor are major. Major amendments to a PUDA shall follow the procedures for Type IV Council land use decisions in Sections 23.76.052, 23.76.054, and 23.76.056.

Extension of Council Land Use Decision

23.76.060 - Expiration and extension of Council land use decisions

E. Extensions. The Council may extend the time limits on Type IV land use decisions for two years or such other time as the Council may determine appropriate, upon an applicant's filing an application to the Department at least 120 days before the approval's expiration. The Council may request a recommendation on the extension application from the Director, but the Hearing Examiner hearing and recommendation requirements of Section 23.76.052 do not apply. Notice of applications for extensions of Type IV land use decisions and an opportunity to comment shall be provided pursuant to subsections 23.76.012.B.1 or B.2, and subsection 23.76.012.B.3, and notice and an opportunity to comment shall also be provided to the parties of record in the Council's original Type IV land use proceeding and to those persons who were provided written notice of the Hearing Examiner's recommendation on the original Type IV application to the extent reasonably practicable.

1. The Council may not extend the time limit for a Type IV land use decision for a project that is not in conformance with applicable regulations, including land use and environmentally critical areas regulations, in effect at the time application for an extension is made.

2. In deciding whether to grant an extension, the Council shall consider:

a. The reason or basis for the application for the extension and whether it is reasonable under the circumstances;

b. Whether changed circumstances in the area support an extension;

c. Whether additional time is reasonably necessary to comply with a condition of approval adopted by the Council that is required to be fulfilled prior to expiration of the Council land use decision.

The request for the Propety Use and Development Agreements (PUDA) amendment and extended time limit is within the spirit and general purpose of the prior decision of the Council and is consistent with the uses and development standards approved in the prior decision of the Council.

The applicant explains that he had been unable to find a development partner given the economic recession and uncertainty created by the COVID-19 pandemic. The original rezone was to match adjacent NC1-30 zoning. Since then, the northern adjacent zoning was updated to NC1-40 (M). To allow the rezone to expire and to revert to LR2 zoning would not be in keeping with the pattern

of development intensity established for the block. There are no modifications in development standards proposed or contemplated as part of this request.

The request would not result in significant adverse impacts that were not anticipated in the prior recommendation to Council and would not result in changes to the prior decision by the Council. Impacts would remain unchanged.

After reviewing the request and general criteria set forth in SMC 23.76.058, **the Director has determined that the amendment sought is a minor amendment**. Therefore, this determination is considered a Type I non-appealable decision.

The applicant will also need to secure from the City Council an extension of the zoning designation established by the concurrent contract rezone as provided in SMC 23.76.060.E. Because the Council may extend that time limit for no more than two years, the extension of the related PUDA should be for the same period.

SDCI recommends **approval of the requested extension,** limited to the duration of any Council extension of the underlying contract zone designation.

Colin R. Vasquez, Senior Land Use Planner Date: 10/29/2020
Seattle Department of Construction and Inspections

CRV:

Vasquez/3036784-LU

SEATTLE CITY COUNCIL
CENTRAL STAFF

December 7, 2020

MEMORANDUM

To: Land Use and Neighborhoods Committee
From: Ketil Freeman, Analyst
Subject: Clerk File 314461 - Application of Martin Liebowitz and 34th and Spring, LLC for an extension of the contract rezone of the property at 1106 34th Avenue. Original contract rezone application approved through CF 314325 and Ordinance 125433.

On December 9, the Land Use and Neighborhoods (LUN) Committee will hear public comment and discuss an application by Martin Liebowitz (the Applicant) on behalf of 34th and Spring, LLC to extend a contract rezone approved by the City Council in 2017. Materials related to the requested extension are filed in Clerk File (CF) 314461.

This memorandum (1) provides background information on the rezone and extension request; (2) describes the type of action and criteria the Council uses in considering a rezone extension; and (3) discusses next steps for Committee action on CF 314461.

Background

In 2017 the Council passed Ordinance 125433, which:

- Rezoned an approximately 11,000 square foot site in the Madrona neighborhood from Lowrise 2 (LR2) multifamily residential to Neighborhood Commercial 1 with a 30-foot height limit and M Mandatory Housing Affordability (MHA) suffix (NC1 30 (M)); and
- Accepted a Property Use and Development Agreement (PUDA) that imposes conditions on future development of the site.

The rezone application did not have an associated permit application for a development project.

The rezone site is located at the northeast corner of the intersection of 34th Avenue and Spring Street. The site is currently developed with a single-family house and a four-plex.
Zoning to the east of the site is Single-family 5000 (SF 5000). The LR2 zoning extends south across East Spring Street. The area immediately north of the site and west of the site across 34th Street is zoned commercial. The height and density of adjacent zoning, except SF 5000 zoning, was increased in 2018 through Ordinance 125791, which implemented the MHA program citywide.

The Applicant, who has been unable to find a development partner for the site due to the pandemic, applied to the Seattle Department of Construction and Inspections (SDCI) for a two-

year rezone extension in July 2020. On October29, 2020, SDCI recommended that the Council approve the extension. See attachment 1.

Type of Action and Extension Criteria

A Council decision on contract rezone extensions is quasi-judicial. However, unlike most quasi-judicial decisions, for which the Hearing Examiner holds an open record hearing and establishes a record for the Council's review, for extension requests SDCI first determines whether the request is for a major or minor amendment to a PUDA. If SDCI determines the request is for a minor amendment, SDCI's recommendation is submitted directly to the Council without review by the Hearing Examiner or opportunity for appeal, which is the case for this extension.

Because there is no open record hearing at the Hearing Examiner, the Council may hear comment from parties-of-record on the rezone extension. Parties of record include those persons who submitted comments to SDCI. Comments received by SDCI are attached (see attachment 2).

Seattle Municipal Code Section 23.76.060.E provides three criteria for Council consideration of contract rezone extensions:

1. The reason or basis for the application for the extension and whether it is reasonable under the circumstances;
2. Whether changed circumstances in the area support an extension;
3. Whether additional time is reasonably necessary to comply with a condition of approval adopted by the Council that is required to be fulfilled prior to expiration of the Council land use decision.

The SDCI recommendation to approve the extension is based on (1) how the pandemic has negatively impacted the real estate industry and (2) the changed circumstance for the neighborhood from passage of the MHA implementation legislation, which increased height and density for most adjacent properties.

Next Steps

The LUN Committee will discuss and may vote on the rezone extension request at its January 13, 2021 meeting. Approval of the extension would require an ordinance extending the contract rezone term and accepting an amended PUDA. A draft bill and amended PUDA are attached. The bill could be introduced prior to the next meeting to allow Committee action. See attachment 3.

Attachments:

1. SDCI Recommendation. October 29, 2020.
2. Extension Request and Combined Public Comment
3. Draft Bill and PUDA amendment

cc: Dan Eder, Interim Director
Aly Pennucci, Supervising Analyst

CITY OF SEATTLE
ANALYSIS AND RECOMMENATION OF THE DIRECTOR OF THE SEATTLE DEPARTMENT OF CONSTRUCTION AND INSPECTIONS

Record Number: 3036784-LU

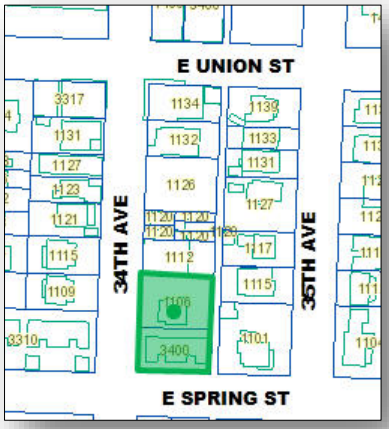
Council File Number: CF # 314461

Applicant Name: Martin Liebowitz

Address of Proposal: 1106 34th Ave

SUMMARY OF PROPOSED ACTION

Extension of original rezone request #3020405-LU. Council Land Use Action to rezone a 4,808 sq. ft. portion of land from LR2 (Lowrise 2) to NC1-30 (M) (Neighborhood Commercial 1 with 30-foot height limit) and a 6,109 sq. ft. parcel of land from LR2 (Lowrise 2) to NC1-30 (M) (Neighborhood Commercial with 30-foot height limit).



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SDCI recommends **approval of the requested extension,** limited to the duration of any Council extension of the underlying contract zone designation.

Colin R. Vasquez, Senior Land Use Planner Date: 10/29/2020
Seattle Department of Construction and Inspections

CRV:

Vasquez/3036784-LU

To: Johnny Harris, SDCI

CC: Lish Whitson, Council Staff

From: Martin Liebowitz

Date: 6/30/2020

RE: EXTENSION NARRATIVE- for Rezone Extension

Request for Rezone Extension – CF 314325

I. Rezone History

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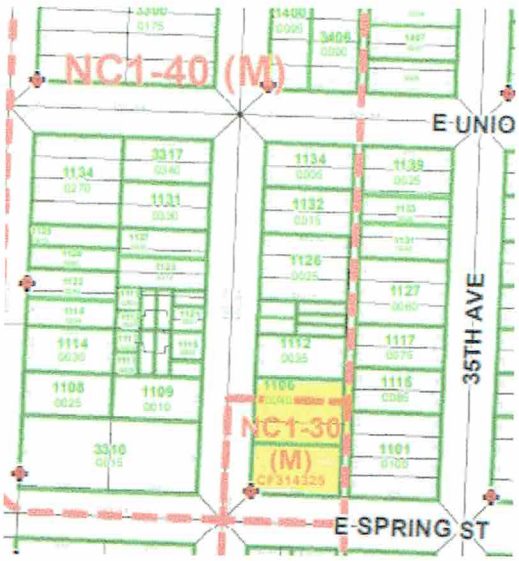

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adjacent zoning was updated to NC1-40 (M), which is even more dense. To allow the rezone to expire and to revert to LR2 zoning would not be in keeping with the pattern of development intensity the City has established for the block.

Yours truly,

Martin Liebowitz

√dRM

Project # 3036784-LU DRM

CURRENT RESIDENT
1131 34TH AVE
SEATTLE WA 98122

If you wish to file written comments and/or receive a notice of the decision, please return this completed form with any written comments you have to: Department of Construction & Inspections, 700 Fifth Ave., Suite 2000, P.O. Box 34019, Seattle, WA 98124-4019 or e-mail PRC@seattle.gov

RECEIVED
JUL 27 2020

Project: #3036784-LU Colin Vasquez, (206) 684-5639 Floor SMT 19

Name: Brianne

Address: 1131 34th ave Seattle

Zip: 98122

Email Address: b.ingertila@comcast.net

Comment: This would be an absolute devastation to the small, quaint neighborhood of Madrona. The Liebowitz family does nothing to help better the community. They have a horrible reputation up here with how they treat the commercial and residental tenants. They are some of the shadiest people I've ever come across and only care about their $. They have kicked out single mothers for noise complaints over newborn babies crying. Later to find out their apartment was never insulated correctly. They put competing businesses right next to each other trying to run other tenants out. They have had several harassment complaints. They cheat contractors out of not paying them correctly. Their buildings are so cheaply and terribly built and are an eye sore on the street. Please do not let this family ruin our neighborhood.

City of Seattle
Department of Construction & Inspections

Notice Date: July 16, 2020

Application for project 3036784-LU

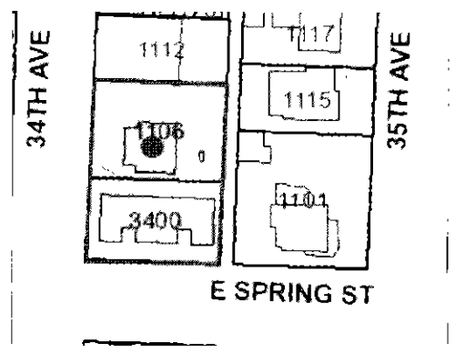
Seattle Department of Construction and Inspections (Seattle DCI) is currently reviewing the Master Use Permit application described below.

Project Number: 3036784-LU
Address: 1106 34TH AVE
Area: Downtown/Central
Zone: NC1-30 (M), NC1-40 (M)

Date of Application: 07/08/2020
Date Application Deemed Complete: 07/08/2020

Applicant Contact: MARTIN LIEBOWITZ - 206-325-0422
SDCI Planner: COLIN VASQUEZ - (206) 684-5639

Council Land Use Action to rezone a 4,808 sq. ft. portion of land from LR2 (Lowrise 2) to NC1-30 (Neighborhood Commercial 1 with 30-foot height limit) and a 6,109 sq. ft. parcel of land from LR2 (Lowrise 2) to NC1-30 (Neighborhood Commercial with 30-foot height limit). Renewal of original rezone request #3020405-LU.
Comments may be submitted through: 07/29/2020
The following approvals are required:



The top of this image is north
This map is for illustrative purposes only In the event of omissions, errors or differences, the documents in Seattle DCI's files will control

Council Rezone Permit Renewal to rezone from Lowrise 2 to Neighborhood Commercial 1 with 30-foot height limit (LR2 to NC1-30').
Other permits that may be needed which are not included in this application:
N/A

Your written comments are encouraged and should be submitted to:
PRC@seattle.gov
Department of Construction & Inspections
ATTN: Public Resource Center
P.O. Box 34019
Seattle, WA 98124-4019

Commenters providing an email address or return US mail address will be sent notice of any public meetings or hearings and notice of the SDCI decision with information on the right to appeal All correspondence will be posted to our electronic library.

Applications requiring shoreline approvals are subject to an initial 30-day comment period. All other land use approvals listed below are subject to an initial 14-day comment period. A 14 day comment period may be extended an additional 14 days provided a written request to extend the comment period is received by this Department within the initial 14-day comment period as published in this bulletin Any comments filed after the end of the official comment period may be considered if pertinent to the review being conducted.

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Interpretations

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√drm

Project # 3036784-LU DRM

PAYTON HELEN E
918 34TH AVE
SEATTLE WA 98122

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

If you wish to file written comments and/or receive a notice of the decision, please return this completed form with any written comments you have to: Department of Construction & Inspections, 700 Fifth Ave., Suite 2000, P.O. Box 34019, Seattle, WA 98124-4019 or e-mail PRC@seattle.gov

RECEIVED
JUL 29 2020

Project: #3036784-LU Colin Vasquez, (206) 684-5639 Floor SMT 19

Name: Helen Payton

Address: 918 34th Ave
Seattle Zip: 98122

Email Address: jakosp44@gmail.com

Comment:
Marty Liebowitz has proven that he plans well and subsequently initiates great projs. in Madrona and on MLK. I appreciate his foresight in developing this property and believe it will complement other structures in the neighborhood.

City of Seattle
Department of Construction & Inspections

Notice Date: July 16, 2020

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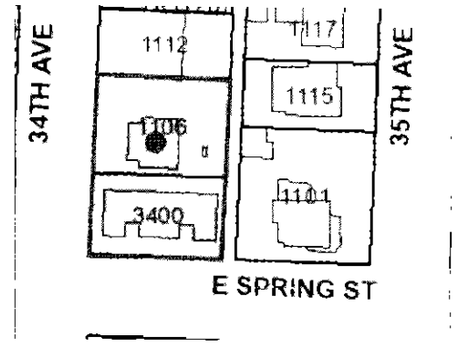

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√dRM

Project # 3036784-LU DRM

MACLEOD JON+HULSEY JAYNE
1700 7TH AVE APT # 2100
SEATTLE WA 98101

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Project: #3036784-LU Colin Vasquez, (206) 684-5639 Floor SMT 19

Name: Jon MacLeod

Address: 1107 36th Avenue

Zip: 98122

Email Address: jonmacleod1@gmail.com

Comment:

City of Seattle
Department of Construction & Inspections

Notice Date: July 16, 2020

Application for project 3036784-LU

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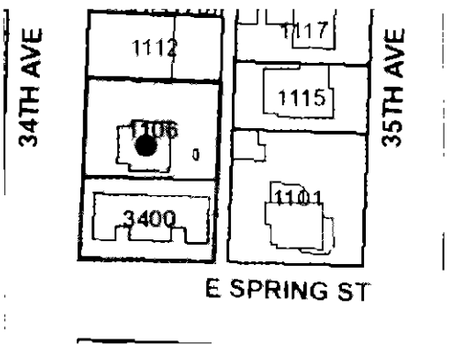

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July 24, 2019

RECEIVED
JUL 27 2020

Dept. of Construction & Inspections
700 5th Avenue - Ste. 2000
P.O. Box 34019
Seattle, Washington 98124-4019
Attn: Colin Vasquez - SMT 19

Project: 3036784-LU

Dear Colin:

This rezone would create dangerous conditions are 34th & Marion. This project is a very short block from St. Teresa School. Marion is a very narrow street, really only room for one direction at a time, difficult at the best of times, as is 35th Avenue north of Marion. During drop-off and pick-up of children from school, it is extremely congested, virtually impassable.

Parking in the neighborhood, just for the people who live there, is already very tight even at night. Add in numerous restaurants, e.g., Red Cow, Hi-Spot, Turkuaz, Madrona Arms, Soleil, Cupcake Royale, etc., etc., plus many other local businesses, e.g., dentist, yoga studio, wine shop, etc., and there often isn't a spot to be found within a two, often three, block radius of 34th & Union.

A much bigger building, 30' high, at a very congested intersection, and adjacent to very narrow streets, will make an already difficult situation much worse, and much more dangerous for the many small children crossing 34th and crossing Marion to and from St. Teresa and Madrona Playfield.

Marty Liebowitz has done a number of large apartment projects in the Madrona business district, but one more is one too many. This rezone project by itself may seem innocuous, but there is a cumulative effect, a tipping point, in a process that at the start did improve the neighborhood, but now becomes a big negative on the quality of life and the safety of children. Enough is enough.

Mr. Liebowitz can build a very nice building and make a profit without exceeding the current height limit.

Sincerely,

Jan MacLeod
1107 36th Avenue

From: Leila Kirske
To: PRC
Subject: Fwd: Response re: Land Use Action #3036784-LU
Date: Sunday, July 19, 2020 9:17:09 AM
Attachments: Rezone letter July 2020.docx

CAUTION: External Email

---------- Forwarded message ---------
From: **Leila Kirske** <lkirske@gmail.com>
Date: Sat, Jul 18, 2020 at 9:08 PM
Subject: Response re: Land Use Action #3036784-LU
To: Vasquez, Colin <Colin.Vasquez@seattle.gov>, <prc@seattle.go>

Attached please find my letter in opposition to the proposed rezone. Please include me on the distribution of correspondence on this project.

Best regards,

Leila Kirske

Leila L Kirske
1101 35th Avenue
Seattle, WA 98122

July 18, 2020

Department of Planning and Development
ATTN: Public Resource Center Assigned Planner
700 5th Avenue, Ste 2000
PO Box 34019
Seattle, WA 98124-4019

Re: Project 3036784-LU

I am writing to express my continued opposition to the rezone of the property described in the above-named project. While development of the property would be beneficial to the neighborhood, the best and most appropriate use would be residential development under the current LR2 zoning.

Per 23.34.018 - Low-rise 2 (LR2) zone is expected to provide a variety of multifamily housing types in existing multifamily neighborhoods, along arterials that have a mix of small-scale residential structures. This definition suits the Madrona neighborhood as it is primarily a residential neighborhood that is augmented by a small number of low-rise multi-family buildings centered at 34th & Union. The area does not draw a significant number of visitors from outside of the neighborhood due to its relatively small size, lack of parking and due to the prolific number of neighboring communities that are more fully developed and which have the physical capacity for a broader range of retail and services. The neighborhood would be enhanced by the development of townhomes and other mixed residential housing that would provide a bridge between single family residential and the existing (and slated for development multi-family projects). This would enhance the multifamily neighborhood for low scale and density per the zoning regulations. Specifically, LR2 zoning supports the stated criterial of:

- Smaller scale structures that are compatible in scale with existing single family and commercial zones. The central Madrona business district is only two short blocks on 34th avenue that is bordered by single family residences to the East and West and community parks to the North and South. Existing structures are generally one to two stories high.
- LR2 zoning supports the gradual transition between single family residences and the existing neighborhood commercial zones. The corner of 34th & Union resides in the middle of the business district, with the “Amara” building slated for development in the future. Maintaining the LR2 zoning of the above noted property would allow a gradual transition from this central density at Union to the single-family homes on Spring that are located at the outward borders. Other boundaries of this commercial zone are parks.
- The area is characterized by local access and circulation conditions as it is a single-family neighborhood. The neighborhood does not attract large volumes of shoppers and restaurant

goers from other neighborhoods – in the manner of Madison Park, Ballard or Greenwood. As such it best accommodates accommodate low density multifamily development.

- Aside from the arterial on 34th avenue, the surrounding streets are extremely narrow and cannot accommodate further increases in vehicular circulation. Existing traffic already heavily utilizes single family residential streets, which can only accommodate one direction at a time. These streets, particularly, 35th Avenue and the side streets of Spring and Union are so narrow that automobile traffic can barely pass through. Oftentimes cars are required to travel in reverse in order to address oncoming vehicles. On more than one occasion, emergency and fire vehicles have not been able to support resident emergency calls in the areas surrounding 35th & Union. Neighbors without off-street parking are routinely displaced, having to park 2 or more blocks from their homes. This is both an inconvenience and a safety issue.
- The area is currently adequately supported by existing or projected facilities and services used by residents. The area is bordered by two parks, Al Larkin and Madrona Elementary. The St. Therese Park is also frequently utilized by residents. Garfield community center is approximately one mile away. Bus service by the #2 and #3 provides easy access to the Garfield community center, downtown Seattle, as well as Lake Washington.

Per 23.34.074 - Neighborhood Commercial 1 (NC1) zones, function are designed to achieve convenience retail sales and services to a residential neighborhood. The area surrounding 34th & Union is a dense residential neighborhood that is not a destination site for retail shopping. There is inadequate weekday daytime population to support more than a handful of businesses. Further, retail needs are supported by nearby shopping centers – Union & MLK and Capitol Hill. As the area is well supported by the #2 and #3 bus lines, the majority of retail needs is served by a short bus ride to Capitol Hill or downtown Seattle.

As noted in my previous letter, existing commercial sites have not been absorbed. To be specific, a large retail space continues to be vacant, more than two years after the exit of the last tenant. Further, newly constructed live-work buildings have not enhanced the community as the majority are closed to the public, with blinds drawn. The majority of these spaces are used as residential facilities. A couple sites appear to have businesses operating on the main floor, however none offer services to the neighborhood community. The livability and walkability of the neighborhood has not been enhanced by these developments. Increasing the number of such developments by up-zoning will be a detriment to the neighborhood.

The function of NC1 is to support or encourage a small shopping area that provides primarily convenience retail sales and services to the adjoining residential neighborhood. The zoning specifies the ability to create a number of small neighborhood serving businesses which continuous storefronts in an atmosphere that is attractive to pedestrians. However these characteristics cannot be effectively met by the up-zoning request. The neighborhood is unable to absorb the capacity of commercial space and many storefronts have remained empty for years at a time. Or contain businesses that are not open to the public. Many businesses close their doors within a year. Currently, the commercial/multi-family building across from the proposed site has parking access on 34th Avenue which breaks up the

walkability of the environment and does not support the door-to-door retail atmosphere attractive to pedestrians.

Locational Criteria for NC1 states that it is most appropriate on land that is generally characterized by being outside of urban villages or isolated or peripheral to the primary business district and with limited transit service. The site does not meet this characteristic as it is supported by more robust commercial and retail services at 23rd & Union, MLK and Union, MLK and Cherry. Further, the area is well served by the #2 and #3 buses which run frequently as well as the #8 which can be accessed at MLK and Union.

Finally, the petitioner has not provided plans to support their development. With such an open-ended request, there is no guarantee that the resulting structures will assimilate respectfully into the neighboring landscape. Over the past 20 years, the landowner has allowed the property to decay and un maintained landscaping is a fire hazard and haven for rodents.

Rezone of the property and a further increase to commercial development would negatively impact the community which has not been able to support commercial properties to date, let alone the potential increase once 33rd Avenue is developed and activated. Neighbors surrounding this small commercial area have become increasingly negatively impacted due to increased traffic and lack of parking. Most concerning are the narrow streets and the inability of fire and emergency vehicles to enter 34th Avenue at Spring and support the residents in the area.

Thank you for your consideration.

Leila Kirske

From: Leila Kirske
To: PRC
Subject: Re: Response re: Land Use Action #3036784-LU
Date: Wednesday, July 22, 2020 9:53:43 AM
Attachments: image002.png

CAUTION: External Email

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Per 23.34.074 - Neighborhood Commercial 1 (NC1) zones, functions are designed to achieve convenience retail sales and services to a residential neighborhood. The area surrounding 34th & Union is a dense residential neighborhood that is not a destination site for retail shopping. There is an inadequate weekday daytime population to support more than a handful of businesses. Further, retail needs are supported by nearby shopping centers – Union & MLK and Capitol Hill. As the area is well supported by the #2 and #3 bus lines, the majority of retail needs is served by a short bus ride to Capitol Hill or downtown Seattle.

As noted in my previous letter, existing commercial sites have not been absorbed. To be specific, a large retail space continues to be vacant, more than two years after the exit of the last tenant. Further, newly constructed live-work buildings have not enhanced the community as the majority are closed to the public, with blinds drawn. The majority of these spaces are used as residential facilities. A couple sites appear to have businesses operating on the main floor, however none offer services to the neighborhood community. The livability and walkability of the neighborhood has not been enhanced by these developments. Increasing the number of such developments by up-zoning will be a detriment to the neighborhood.

The function of NC1 is to support or encourage a small shopping area that provides primarily convenience retail sales and services to the adjoining residential neighborhood. The zoning specifies the ability to create a number of small neighborhoods serving businesses with continuous storefronts in an atmosphere that is attractive to pedestrians. However these characteristics cannot be effectively met by the up-zoning request. The neighborhood is unable to absorb the capacity of commercial space and many storefronts have remained empty for years at a time. Or contain businesses that are not open to the public. Many businesses close their doors within a year. Currently, the commercial/multi-family building across from the proposed site has parking access on 34th Avenue which breaks up the walkability of the environment and does not support the door-to-door retail atmosphere attractive to pedestrians.

Locational Criteria for NC1 states that it is most appropriate on land that is generally characterized by being outside of urban villages or isolated or peripheral to the primary business district and with limited transit service. The site does not meet this characteristic as it is supported by more robust commercial and retail services at 23rd & Union, MLK and Union, MLK and Cherry. Further, the area is well served by the #2 and #3 buses which run frequently as well as the #8 which can be accessed at MLK and Union.

Finally, the petitioner has not provided plans to support their development. With such an open-ended request, there is no guarantee that the resulting structures will assimilate respectfully into the neighboring landscape. Over the past 20 years, the landowner has allowed the property to decay and un maintained landscaping is a fire hazard and haven for rodents.

Rezone of the property and a further increase to commercial development would negatively impact the community which has not been able to support commercial properties to date, let alone the potential increase once 33rd Avenue is developed and activated. Neighbors surrounding this small commercial area have become increasingly negatively impacted due to increased traffic and lack of parking. Most concerning are the narrow streets and the inability of fire and emergency vehicles to enter 34th Avenue at Spring and support the residents in the area.

Thank you for your consideration.

Leila Kirske

On Wed, Jul 22, 2020 at 8:24 AM PRC <PRC@seattle.gov> wrote:

Hello Leila,

Please submit any comments either in the body of the email or in PDF format. We are unable to attach Word documents to our file system, and this format is inaccessible to community members who may lack the software.

Thank you,

Public Resource Center

Land Use Division

City of Seattle Department of Construction and Inspections

From: Vasquez, Colin <Colin.Vasquez@seattle.gov>
Sent: Monday, July 20, 2020 7:16 AM
To: PRC <PRC@seattle.gov>; Leila Kirske <lkirske@gmail.com>
Subject: Response re: Land Use Action #3036784-LU

From: Leila Kirske <lkirske@gmail.com>
Sent: Saturday, July 18, 2020 9:08 PM
To: Vasquez, Colin <Colin.Vasquez@seattle.gov>; prc@seattle.go
Subject: Response re: Land Use Action #3036784-LU

CAUTION: External Email

> Attached please find my letter in opposition to the proposed rezone. Please include me on the distribution of correspondence on this project.
>
> Best regards,
>
> Leila Kirske

From: pepitre82@yahoo.com
To: PRC
Subject: (Shaping Seattle) Comment about Project 3036784-LU at 1106 34TH AVE
Date: Thursday, October 15, 2020 9:34:53 AM

This property obstructs the alley way and hinders both business and personal access. The owner of this property has put up a fence that blocks the alley access and has allowed tenants to park at the south end of the alley in way that does not allow access traveling North. For this project to gain clearance, the owner of these parcels of land must be required to open the alley and to stop hindering traffic to businesses and residences.

WRITTEN COMMENT

From: Sarah Banks
sarahb@saranjan.com

7/27/2020

To: SDCI
PRC@seattle.gov

RE: Project Number 3036784-LU
Address: 1106 34th Avenue, Seattle, WA

I support this Application. Extending the time period for this rezone, due to delays resulting from the Covid-19 crises, should be approved. The small Madrona Business District needs help in maintaining its vitality. A new mixed-use building at this location will contribute to this goal, by adding additional residential and commercial space to the District.

Yours truly,
Sarah Banks

PRC

From: Jania Garcia <janiag@gmail.com>
Sent: Monday, July 27, 2020 7:45 PM
To: PRC
Subject: written comment supporting rezone extension for project # 3036784-LU

Categories: Matthew

CAUTION: External Email

WRITTEN COMMENT
Supporting Rezone Extension Application

From: Jania Garcia
janiag@gmail.com
1608 B 37th Ave.
Seattle WA 98122

Date: 7/27/2020

To: SDCI
PRC@seattle.gov

Attn: Colin Vasquez

Concerning: Project Number 3036784-LU
Address: 1106 34th Avenue, Seattle, WA

Please extend the time period for this contract rezone for an additional 3 years.

According to the SEPA Application from the original application for this rezone, NC zoning is the most appropriate zoning classification for this site. Small business districts need an adequate quantity of mixed-use zoned property to allow them to thrive and be vibrant places to visit and shop. Maintaining the NC zoning of this site to match the adjacent NC zoning on the rest of the block would help accomplish this goal.

Thank you,
Jania Garcia

WRITTEN COMMENTS
(In Support of Application)

Date: 7/27/2020

To: Colin Vasquez
SDCI, Seattle Department of Construction & Inspection
PRC@seattle.gov

RE: Project Number 3036784-LU
1106 34th Avenue, Seattle, Wa.

My name is Scott Enderle. I lived in the Madrona Business District for a number of years and now manage several buildings in the neighborhood. I am writing to support this Application to extend the time on this Contract Rezone.

With all the chaos created in the design and construction industries by the Covid-19 pandemic in Seattle, it is necessary for the City to give developers more time to design their projects and submit their MUP applications, as well as provide additional time on already approved building permits.

Currently, understanding the economics of real estate development is impossible due to the Pandemic- renters are unable to pay their monthly rent, and retailers are going bankrupt. Hence, creating a proforma for new projects is difficult and risky. Trying to figure out the financials for new projects, by developers and financial institutions alike, is very difficult. It's important for the City to provide the necessary and permitted time extensions for Contract Rezones until this Pandemic has passed.

Please approve this application to extend the time in this Contract Rezone. I would suggest you extend the time for a period of 3 years following King County getting to Phase 4 of the Governor's Phased Approach to Reopening.

Thank you,
Scotty Enderle
swfenderle@gmail.com

WRITTEN COMMENT
In Support of the Application

From: Malcolm Harker
Email: Headludd@mail.com

Date: 7/27/2020

To: SDCI
Re: Application for Renewal of Contract Rezone
Project Number: 3036784-LU
Address: 1106 34th Avenue, Seattle, WA

I am writing in support of this Application. This site should match the zoning at the rest of this 2 block Commercial district (East side of 34th Ave. between E. Pike St. and E. Spring St.). All sites in this two block area are zoned neighborhood commercial (NC) except for this one. The old residential zoning (LR2) is inappropriate. This is clearly a mapping error- the site should have been remapped long ago to NC to reinforce the small Madrona Business District. Due to the Covid-19 Pandemic, the applicant should be afforded more time to produce his building design and submit his MUP application. I suggest an additional 3 year extension is appropriate, considering a vaccine for Covid will not be available for most US citizens until next August, 2021 at the earliest.

Yours truly,
Malcolm Harker

PRC

From: STEVEN PELTIN <peltin@comcast.net>
Sent: Tuesday, July 28, 2020 11:18 PM
To: PRC
Subject: Application #3036784-LU

CAUTION: External Email

Written Comments

In Support of Application

To: SDCI

Date: 7/27/2020

PRC@seattle.gov

Attn: Colin Vasquez

RE: Project Number 3036784-LU

1106 34 th Avenue, Seattle, Wa.

Dear Mr. Vasquez,

I don't know whether you remember me, but I am certain that we have spoken over the course of the last ten years that I have been a gift shop owner in the Madrona neighborhood of Seattle. I hope that this letter finds you in good health and bearing up as well as possible during this difficult time.

I write to you now to express my support for a three-year extension on the application for project #3036784-LU, which will be located at 1106 34th Avenue when it is completed.I have no doubt that the new building, which Madrona resident Marty Liebowitz is designing, will contribute significantly to the vibrance of the Madrona community, providing both additional retail space and more residential units along the pleasantly bustling 34th Street business corridor. Unfortunately, as has been the case for many people, the current coronavirus pandemic has caused unforeseen delays in Marty's work — he needs more time to design his new building, but he definitely wants to build!

As someone who has been a business owner in Madrona for a decade, I have seen how the neighborhood has benefitted as more business and residential spaces have become available, and I believe that NC zoning is the most appropriate for this site by allowing for both uses. Please extend the time for this Contract Rezone.

Thank you so much for taking the time to read my comments, and stay safe!

Sincerely,

Nena Peltin
peltin@comcast.net
Owner of Nena Gifts, Gallery & Vintage in Madrona

Date: July 27, 2020

To: SDCI
prc@seattle.gov
Attn: Colin Vasquez

Re: Project #3036784-LU
1106 34th Ave
Seattle, Washington

Dear Mr. Vasquez:

I am writing in support of an extension for the time period for the contract rezone: Project #3036784-LU for an additional three years. COVID-19 has caused many architects to reduce their workloads so that they may safely socially distance and work on a limited basis from home.

Additionally, the recent MHA Law was approved a year after this applicant received his final approval for the contract rezone from the Seattle City Council, causing the applicant to wait a year to start his design, as the contract rezone approval included a payment provision to the MHA Affordable Housing Fund. Both the timing of the MHA approval by Council, and the arrival of the pandemic have contributed to the applicant's need for additional time to design his building. I support this.

Also, according to the SEPA application form, the original application for this rezone, NC zoning, was found by SDCI to be the most appropriate zoning classification for this site. To this I also agree. Small business districts need an adequate quantity of mixed-use zoned property to allow them to thrive and be vibrant places to visit and shop. Rezoning this site to match the adjacent NC zoning on the rest of the block would help accomplish this goal.

I support extending the time period for this contract rezone for an additional period of three years.

Sincerely,
Frida Weisman
fridaweisman@gmail.com

CITY OF SEATTLE

ORDINANCE _____

COUNCIL BILL _____

..title

AN ORDINANCE approving the extension of a contract rezone approved by Ordinance 125433 and accepting an amended Property Use and Development Agreement for a property located at 1106 34th Avenue. (Petition by Martin Leibowitz, C.F. 314461, SDCI Project 3036784-LU)

..body

WHEREAS, on October 9, 2017, the City Council passed Ordinance 125433 on October 9, 2017, approving a contract rezone for a property located at 1106 34th Avenue (Property) and accepting a Property Use and Development Agreement (PUDA); and

WHEREAS, the PUDA imposed conditions and covenants on future development of the Property; and

WHEREAS, Martin Leibowitz now seeks to extend the expiration date for the PUDA and contract rezone, by two additional years, in order to complete the development of the Property; and

WHEREAS, pursuant to Seattle Municipal Code (SMC) subsection 23.76.060.E, the City Council may extend the time limit on a Type IV land use decision by up to two years; and

WHEREAS, the Seattle Department of Construction and Inspections (SDCI) recommended that the Council approve the extension request on October 29, 2020;

WHEREAS, the SDCI recommendation is filed in Clerk File 314461;

WHEREAS; the City Council, pursuant to SMC subsection 23.76.060.E.2, finds the extension request to be reasonable and in the public interest; NOW, THEREFORE,

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. The zoning designation established by Ordinance 125433 is extended for two years from the effective date of this ordinance.

DRAFT

Section 2. The Council accepts the Property Use and Development Agreement amendment attached to this ordinance as Exhibit A.

Section 3. The City Clerk is authorized and directed to file this ordinance and amended PUDA in the King County Recorder's Office; to file, upon return of the ordinance from the King County Recorder's Office, the original of this ordinance at the City Clerk's Office; and to deliver copies of the same to the Director of the Seattle Department of Construction and Inspections and to the King County Assessor's Office.

DRAFT

Section 4. This ordinance, effectuating a quasi-judicial decision of the City Council and not subject to mayoral approval or disapproval, shall take effect and be in force 30 days from and after its passage and approval by the City Council.

Passed by the City Council the _____ day of _____, 2021, and signed by me in open session in authentication of its passage this _____ day of _____, 2021.

_____

President _____ of the City Council

Filed by me this _____ day of _____, 2021.

_____

Monica Martinez Simmons, City Clerk

(Seal)

DRAFT

Amendment to Property Use and Development Agreement

When Recorded, Return to:	
THE CITY CLERK 600 Fourth Avenue, Floor 3 PO Box 94728 Seattle, Washington 98124-4728	

AMENDED PROPERTY USE AND DEVELOPMENT AGREEMENT

Grantor(s):	(1)	Martin Liebowitz	(2)	34th and Spring LLC
☐ Additional grantors on page _____				
Grantee:	(1)	The City of Seattle		
☐ Additional on page _____				
Legal Description (*abbreviated if necessary*)**:**		THE SOUTH 25 FEET OF LOT 2 AND LOT 3, BLOCK 2, MARION HIGHLANDS ADDITION TO THE CITY OF SEATTLE, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 15 OF PLATS, PAGE 61, RECORDS OF KING COUNTY, WASHINGTON		
☐ Additional legal description on page _____:				
Assessor's Tax Parcel ID #:		5157700040 (part) and 5157700055		
Reference Nos. of Documents Released or Assigned:				

THIS AMENDMENT (the "Amendment") to the PROPERTY USE AND DEVELOPMENT AGREEMENT recorded under King County Recording Number 20171116000748 (the "PUDA") is executed this _____ day of _____, 2021, in favor of the CITY OF SEATTLE (the "City"), a Washington municipal corporation, by the 34th and Spring LLC, a Washington limited liability company (the "Owners").

All terms not defined herein shall have the same meaning as in the PUDA.

DRAFT

1. A new Section 9 is added to the PUDA to read as follows:

   Section 9. Notwithstanding the expiration provision in Section 3, this Agreement is extended for an additional period of two years from the effective date of the ordinance accepting this Amendment and extending the rezone.

2. No Other Changes. Except as set forth herein, the PUDA shall remain in full force and effect.

DRAFT

[*Signature Pages Follow*]

DRAFT

SIGNED this _____ day of January, 2021.

OWNERS:

34TH AND SPRING LLC,
a Washington limited liability company

By:_____
Name:_____
Its:_____

By:_____
Martin Liebowitz

DRAFT

STATE OF WASHINGTON
} ss.
COUNTY OF KING

I certify that I know or have satisfactory evidence that _____ is the person who appeared before me, and said person acknowledged that (he/she) signed this instrument, on oath stated that (he/she) was authorized to execute the instrument and acknowledged it as the _____ of 34th and Spring LLC, a Washington limited liability company, to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

Dated this _____ day of _____ , 20_____ .

_____
Printed Name
Notary Public in and for the State of Washington, residing at
My Commission Expires

STATE OF WASHINGTON
} ss.
COUNTY OF KING

I certify that I know or have satisfactory evidence that Martin Liebowitz is the person who appeared before me, and said person acknowledged that he signed this instrument and acknowledged it to be his free and voluntary act for the uses and purposes mentioned in the instrument.

Given under my hand and official seal this _____ day of _____ , 20_____ .

_____
Printed Name
Notary Public in and for the State of Washington, residing at
My Commission Expires

DRAFT

DRAFT

File #: CB 119987, **Version:** 1

CITY OF SEATTLE

ORDINANCE _____

COUNCIL BILL _____

AN ORDINANCE approving the extension of a contract rezone approved by Ordinance 125433 and accepting an amended Property Use and Development Agreement for a property located at 1106 34th Avenue. (Petition by Martin Leibowitz, C.F. 314461, SDCI Project 3036784-LU)

WHEREAS, the City Council passed Ordinance 125433 on October 9, 2017, approving a contract rezone for a property located at 1106 34th Avenue (Property) and accepting a Property Use and Development Agreement (PUDA); and

WHEREAS, the PUDA imposed conditions and covenants on future development of the Property; and

WHEREAS, the City passed Ordinance 125791 on March 18, 2018, which upzoned commercial and multifamily zoned sites adjacent to the Property to implement the Mandatory Housing Affordability program; and

WHEREAS, Martin Leibowitz now seeks to extend the expiration date for the PUDA and contract rezone, by two additional years, in order to complete the development of the Property; and

WHEREAS, pursuant to Seattle Municipal Code (SMC) subsection 23.76.060.E, the City Council may extend the time limit on a Type IV land use decision by up to two years; and

WHEREAS, the Seattle Department of Construction and Inspections (SDCI) recommended that the Council approve the extension request on October 29, 2020; and

WHEREAS, the SDCI recommendation is filed in Clerk File 314461; and

WHEREAS; the City Council, pursuant to SMC subsection 23.76.060.E.2, finds the extension request to be reasonable, warranted by changed circumstances from passage of Ordinance 125791, and in the public

interest; NOW, THEREFORE,

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. The zoning designation established by Ordinance 125433 is extended for two years from the effective date of this ordinance.

Section 2. The Council accepts the Amended Property Use and Development Agreement (PUDA) attached to this ordinance as Exhibit A.

Section 3. The City Clerk is authorized and directed to file this amended PUDA in the King County Recorder's Office; to file, upon return of the amended PUDA from the King County Recorder's Office, the original amended PUDA at the City Clerk's Office; and to deliver copies of the same to the Director of the Seattle Department of Construction and Inspections and to the King County Assessor's Office.

Section 4. This ordinance, effectuating a quasi-judicial decision of the City Council and not subject to mayoral approval or disapproval, shall take effect and be in force 30 days from and after its passage and approval by the City Council.

Passed by the City Council the _____ day of _____, 2021, and signed by me in open session in authentication of its passage this _____ day of _____, 2021.

_____

President _____ of the City Council

Filed by me this _____ day of _____, 2021.

_____

Monica Martinez Simmons, City Clerk

(Seal)

Attachments:
Exhibit A - Amended PUDA

Amended Property Use and Development Agreement

When Recorded, Return to:	
THE CITY CLERK 600 Fourth Avenue, Floor 3 PO Box 94728 Seattle, Washington 98124-4728	

AMENDED PROPERTY USE AND DEVELOPMENT AGREEMENT

Grantor(s):	(1)	Martin Liebowitz	(2)	34th and Spring LLC
☐ Additional grantors on page _____				
Grantee:	(1)	The City of Seattle		
☐ Additional on page _____				
Legal Description (*abbreviated if necessary*)**:**		THE SOUTH 25 FEET OF LOT 2 AND LOT 3, BLOCK 2, MARION HIGHLANDS ADDITION TO THE CITY OF SEATTLE, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 15 OF PLATS, PAGE 61, RECORDS OF KING COUNTY, WASHINGTON		
☐ Additional legal description on page _____:				
Assessor's Tax Parcel ID #:		5157700040 (part) and 5157700055		
Reference Nos. of Documents Released or Assigned:				

THIS AMENDMENT (the "Amendment") to the PROPERTY USE AND DEVELOPMENT AGREEMENT recorded under King County Recording Number 20171116000748 (the "PUDA") is executed this _____ day of _____, 2021, in favor of the CITY OF SEATTLE (the "City"), a Washington municipal corporation, by the 34th and Spring LLC, a Washington limited liability company (the "Owners").

All terms not defined herein shall have the same meaning as in the PUDA.

1. A new Section 9 is added to the PUDA to read as follows:

   Section 9. Notwithstanding the expiration provision in Section 3, this Agreement is extended for an additional period of two years from the effective date of the ordinance accepting this Amendment and extending the rezone.

2. No Other Changes. Except as set forth herein, the PUDA shall remain in full force and effect.

[*Signature Pages Follow*]

SIGNED this _____ day of January, 2021.

OWNERS:

34TH AND SPRING LLC,
a Washington limited liability company

By:_____
Name:_____
Its:_____

By:_____
Martin Liebowitz

STATE OF WASHINGTON
} ss.
COUNTY OF KING

I certify that I know or have satisfactory evidence that _____ is the person who appeared before me, and said person acknowledged that (he/she) signed this instrument, on oath stated that (he/she) was authorized to execute the instrument and acknowledged it as the _____ of 34th and Spring LLC, a Washington limited liability company, to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

Dated this _____ day of _____ , 20_____ .

_____
Printed Name
Notary Public in and for the State of Washington, residing at
My Commission Expires

STATE OF WASHINGTON
} ss.
COUNTY OF KING

I certify that I know or have satisfactory evidence that Martin Liebowitz is the person who appeared before me, and said person acknowledged that he signed this instrument and acknowledged it to be his free and voluntary act for the uses and purposes mentioned in the instrument.

Given under my hand and official seal this _____ day of _____ , 20_____ .

_____
Printed Name
Notary Public in and for the State of Washington, residing at
My Commission Expires

SUMMARY and FISCAL NOTE*

Department:	Dept. Contact/Phone:	CBO Contact/Phone:
LEG	Freeman / 48178	NA

** Note that the Summary and Fiscal Note describes the version of the bill or resolution as introduced; final legislation including amendments may not be fully described.*

1. BILL SUMMARY

Legislation Title:

AN ORDINANCE approving the extension of a contract rezone approved by Ordinance 125433 and accepting an amended Property Use and Development Agreement for a property located at 1106 34th Avenue. (Petition by Martin Leibowitz, C.F. 314461, SDCI Project 3036784-LU)

Summary and background of the Legislation:

This legislation would extend for two years a contract rezone approved by Ordinance 125433 for a property located at 1106 34th Avenue in the Madrona neighborhood. Ordinance 125433: (1) rezoned the property from Lowrise 2 multifamily residential to Neighborhood Commercial 1 with a 30 foot height limit and M Mandatory Housing Affordability suffix and (2) accepted a Property Use and Development Agreement imposing rezone conditions.

Pursuant to Seattle Municipal Code Section 23.76.060.E, the Council may extend a contract rezone for up to two years after considering whether the basis for the extension is reasonable, whether changed circumstances support the extension, and whether additional time is reasonably necessary.

2. CAPITAL IMPROVEMENT PROGRAM

Does this legislation create, fund, or amend a CIP Project? ___ Yes _X__ No
If yes, please fill out the table below and attach a new (if creating a project) or marked-up (if amending) CIP Page to the Council Bill. Please include the spending plan as part of the attached CIP Page. If no, please delete the table.

3. SUMMARY OF FINANCIAL IMPLICATIONS

Does this legislation amend the Adopted Budget? ___ Yes _X__ No
If there are no changes to appropriations, revenues, or positions, please delete the table below.

Does the legislation have other financial impacts to the City of Seattle that are not reflected in the above, including direct or indirect, short-term or long-term costs?
No

Is there financial cost or other impacts of *not* implementing the legislation?
If the extension is not approved future development of the site may not be subject to the City's Mandatory Housing Affordability Program codified in Seattle Municipal Code Chapter 23.58B and 23.58C.

4. OTHER IMPLICATIONS

a. Does this legislation affect any departments besides the originating department?
If so, please list the affected department(s) and the nature of the impact (financial, operational, etc.).
This legislation affects the Seattle Department of Construction and Inspections, which accepted the application for the extension and recommends approval of the extension.

b. Is a public hearing required for this legislation?
No.

c. Does this legislation require landlords or sellers of real property to provide information regarding the property to a buyer or tenant?
No.

d. Is publication of notice with *The Daily Journal of Commerce* and/or *The Seattle Times* required for this legislation?
No.

e. Does this legislation affect a piece of property?
Yes, see the rezone map for Ordinance 125433.

f. Please describe any perceived implication for the principles of the Race and Social Justice Initiative. Does this legislation impact vulnerable or historically disadvantaged communities? What is the Language Access plan for any communications to the public?
This is a land use regulatory decision, which the Council must consider when an application is filed. Race and Social Justice Initiative implications associated with the City's land use regulatory regime are discussed in the Comprehensive Plan, for which this action is an implementing step.

g. If this legislation includes a new initiative or a major programmatic expansion: What are the specific long-term and measurable goal(s) of the program? How will this legislation help achieve the program's desired goal(s).
NA
List attachments/exhibits below:

1438

FILED
CITY OF SEATTLE
21 JAN 28 PM 12:54
CITY CLERK

Amendment to Property Use and Development Agreement

When Recorded, Return to:	
THE CITY CLERK 600 Fourth Avenue, Floor 3 PO Box 94728 Seattle, Washington 98124-4728	

AMENDED PROPERTY USE AND DEVELOPMENT AGREEMENT

Grantor(s):	(1)	34TH & SPRING LLC	(2)	CHANUKAH PROPERTY LLC
☐ Additional grantors on page _____				
Grantee:	(1)	The City of Seattle		
☐ Additional on page _____				
Legal Description (*abbreviated if necessary*):		THE SOUTH 25 FEET OF LOT 2 AND LOT 3, BLOCK 2, MARION HIGHLANDS ADDITION TO THE CITY OF SEATTLE, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 15 OF PLATS, PAGE 61, RECORDS OF KING COUNTY, WASHINGTON		
☐ Additional legal description on page _____:				
Assessor's Tax Parcel ID #:		5157700040 (part) and 5157700055		
Reference Nos. of Documents Released or Assigned:				

THIS AMENDMENT (the "Amendment") to the PROPERTY USE AND DEVELOPMENT AGREEMENT recorded under King County Recording Number 20171116000748 (the "PUDA") is executed this 27 day of Jan, 2021, in favor of the CITY OF SEATTLE (the "City"), a Washington municipal corporation, by 34TH AND SPRING LLC, a Washington limited liability company and CHANUKAH PROPERTY LLC, a Washington limited liability company (the "Owners").

All terms not defined herein shall have the same meaning as in the PUDA.

1. A new Section 9 is added to the PUDA to read as follows:

   Section 9. Notwithstanding the expiration provision in Section 3, this Agreement is extended for an additional period of two years from the effective date of the ordinance accepting this Amendment and extending the rezone.

2. No Other Changes. Except as set forth herein, the PUDA shall remain in full force and effect.

[*Signature and Acknowledgement Pages Follow*]

SIGNED this 27 day of January, 2021.

OWNERS:

34TH AND SPRING LLC,
a Washington limited liability company

By: _____
Name: _____
Its: Manager

CHANUKAH PROPERTY LLC,
a Washington limited liability company

By: _____
Name: _____
Its: Manager

STATE OF WASHINGTON

} ss.

COUNTY OF KING

I certify that I know or have satisfactory evidence that Martin Liebowitz is the person who appeared before me, and said person acknowledged that (he/she) signed this instrument, on oath stated that (he/she) was authorized to execute the instrument and acknowledged it as the Manager of 34TH AND SPRING LLC, a Washington limited liability company, to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

Dated this 27th day of January, 2021.

NIDA MARTIN
Notary Public
State of Washington
Commission # 93583
My Comm. Expires Jun 9, 2023

Nida Martin

Nida Martin
Printed Name
Notary Public in and for the State of Washington,
residing at Renton
My Commission Expires 6/9/23

STATE OF WASHINGTON

} ss.

COUNTY OF KING

I certify that I know or have satisfactory evidence that Martin Liebowitz is the person who appeared before me, and said person acknowledged that (he/she) signed this instrument, on oath stated that (he/she) was authorized to execute the instrument and acknowledged it as the Manager of CHANUKAH PROPERTY LLC, a Washington limited liability company, to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

Dated this 27th day of January, 2021.

NIDA MARTIN
Notary Public
State of Washington
Commission # 93583
My Comm. Expires Jun 9, 2023

Nida Martin

Nida Martin
Printed Name
Notary Public in and for the State of Washington,
residing at Renton
My Commission Expires 6/9/23

File #: Res 31987, **Version:** 1

CITY OF SEATTLE

RESOLUTION _____

A RESOLUTION sponsoring the King County Regional Homelessness Authority's application for membership to the Association of Washington Cities Risk Management Service Agency.

WHEREAS, The City of Seattle funds the King County Regional Homelessness Authority (KCRHA), created under the Interlocal Cooperation Act (chapter 39.34 RCW) and through an interlocal agreement authorized by Ordinance 126021; and

WHEREAS, the KCRHA provides consolidated services for individuals and families who are experiencing homelessness or who are at imminent risk of experiencing homelessness in the jurisdictional boundaries of King County, services that have previously been provided by The City of Seattle with its own staff in the Seattle Human Services Department; and

WHEREAS, the KCRHA is requesting membership into the Association of Washington Cities Risk Management Service Agency (AWC RMSA) as a quasi-municipal entity; and

WHEREAS, the AWC RMSA requires that a current member, The City of Seattle, sponsor a non-city entity's request for membership into the AWC RMSA; NOW, THEREFORE,

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF SEATTLE, THE MAYOR CONCURRING, THAT:

Section 1. The City of Seattle sponsors the King County Regional Homelessness Authority's application for membership in the Association of Washington Cities Risk Management Service Agency, and requests that membership be granted effective February 1, 2021.

Adopted by the City Council the _____ day of _____, 2021, and signed by me in open session in authentication of its adoption this _____ day of _____, 2021.

_____

President _____ of the City Council

The Mayor concurred the _____ day of _____, 2021.

_____

Jenny A. Durkan, Mayor

Filed by me this _____ day of _____, 2021.

_____

Monica Martinez Simmons, City Clerk

(Seal)

SUMMARY and FISCAL NOTE*

Department:	Dept. Contact/Phone:	CBO Contact/Phone:
Human Services Department	Sola Plumacher/206-247-1645	Daniel Kirk/206-727-8517

** Note that the Summary and Fiscal Note describes the version of the bill or resolution as introduced; final legislation including amendments may not be fully described.*

1. BILL SUMMARY

Legislation Title: A RESOLUTION sponsoring the King County Regional Homelessness Authority's application for membership to the Association of Washington Cities Risk Management Service Agency.

Summary and background of the Legislation:
A resolution from an Association of Washington Cities (AWC) member city supporting entrance of a non-city entity is required for any non-city entity to enter the AWC Insurance Risk Pool. The AWC Insurance Risk Pool has been identified as a strong option for providing insurance to the KCRHA (Commercial General Liability, Workers Compensation, Directors & Officers Liability).

2. CAPITAL IMPROVEMENT PROGRAM

Does this legislation create, fund, or amend a CIP Project? ___ Yes __X_ No

3. SUMMARY OF FINANCIAL IMPLICATIONS

Does this legislation amend the Adopted Budget? ___ Yes _X__ No

Does the legislation have other financial impacts to the City of Seattle that are not reflected in the above, including direct or indirect, short-term or long-term costs?
No.

Is there financial cost or other impacts of *not* implementing the legislation?
Not adopting the resolution by January 25, 2021 would mean that the KCRHA cannot obtain risk insurance from the AWC before the KCRHA's first employee begins working and would need to explore different (likely more expensive) options for obtaining necessary insurance coverage.

4. OTHER IMPLICATIONS

a. Does this legislation affect any departments besides the originating department?
This resolution has implications for the KCRHA, which is a separate governmental administrative agency that is being funded jointly by the City of Seattle and King County.

b. Is a public hearing required for this legislation?
No.

c. Is publication of notice with *The Daily Journal of Commerce* and/or *The Seattle Times* required for this legislation?
No.

d. Does this legislation affect a piece of property?
No.

e. Please describe any perceived implication for the principles of the Race and Social Justice Initiative. Does this legislation impact vulnerable or historically disadvantaged communities? What is the Language Access plan for any communications to the public?
None.

f. Climate Change Implications

1. **Emissions: Is this legislation likely to increase or decrease carbon emissions in a material way?**
   No.

2. **Resiliency: Will the action(s) proposed by this legislation increase or decrease Seattle's resiliency (or ability to adapt) to climate change in a material way? If so, explain. If it is likely to decrease resiliency in a material way, describe what will or could be done to mitigate the effects.**
   No.

g. If this legislation includes a new initiative or a major programmatic expansion: What are the specific long-term and measurable goal(s) of the program? How will this legislation help achieve the program's desired goal(s).
Not applicable.

List attachments/exhibits below:

SEATTLE CITY COUNCIL

600 Fourth Ave. 2nd Floor
Seattle, WA 98104

Legislation Text

File #: Appt 01780, **Version:** 1

Reappointment of ChrisTiana ObeySumner as member, Seattle Renters' Commission, for a term to February 28, 2021.

The Appointment Packet is provided as an attachment.

1446

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *ChrisTiana ObeySumner*		
Board/Commission Name: *Seattle Renters' Commission*		**Position Title:** *Member*
☐ **Appointment** ***OR*** ☒ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ Council ☒ Mayor ☐ Other: *Fill in appointing authority*	**Date Appointed:** 3/1/2019	**Term of Position: *** 3/1/2019 **to** 2/28/2021
Residential Neighborhood: *Haller Lake*	**Zip Code:** *98133*	**Contact Phone No.:** *Business phone # - NOT personal phone #*
Background: *ChrisTiana ObeySumner is an Alaskan-Born, Philly-Raised, East-Coast transplant who moved to the area in 2010 to attend Seattle University as a Transfer Scholar. They have a BS in Psychology, a Masters in Nonprofit Leadership, and is currently pursuing their M.Ed. in Clinical Mental Health & Addictions Counseling. Their area of expertise and research is the relationship between marginalized and oppressed intersectionalities and access to basic human needs and rights in American society. ChrisTiana is the chair of the Housing Committee within the Seattle Commission for People with disAbilities and is also the founding Executive Director of the Eleanor Elizabeth Institute for Black Empowerment.*		
Authorizing Signature (original signature): Jenny A. Durkan	**Appointing Signatory:** *Jenny Durkan* *Mayor, City of Seattle*	

FILED
CITY OF SEATTLE
19 DEC -3 AM 11:50
CITY CLERK

**Term begin and end date is fixed and tied to the position and not appointment date.*

Epiphanies of Equity: Education & Consulting

ChrisTiana ObeySumner, MNPL

[redacted]

Framework and Approach:

As a Social Equity Educator, Consultant, and Advocate, I combine "social psychology for social justice" and first-hand experience as a queer, disabled Black womxn to empower change initiatives that expand horizons of understanding across identity and intersections in the spirit of community and cultural humility.

Summary of Skills:

- Ignition of actionable partnerships and allyship building, with congenial coalition management
- Facilitation of difficult conversations with patience, empathy, and a sense of humor
- Agile anticipation to changing priorities of obstacles to implementation
- Critical analysis and conflict management in complex situations
- Dynamic business storytelling and masterful public speaking
- Tact and diplomacy identifying causes for social problems
- Change leadership and emotional intelligence
- Cognitive flexibility and abstract thinking

Education

- **Masters of Public Administration,** *(In Process)*, Seattle University, *2018-2019*
- **M. Ed., Clinical Mental Health Counselling** *(On Hold)*, Seattle University, *2016-2017; 2019-2021*
- **Master of Non-Profit Leadership**, Seattle University, *2014-2016*
- **B. Sc., Psychology**, Dept. Honors. Magna Cum Laude, Seattle University, *2010-2013*
- **A.A., Journalism,** Jefferson County Community and Technical College, Louisville, KY *2008-2010*

Highlighted Clients and Contracts:

- Seattle Opera, Social Impact Consultant
- Solid Ground, Diversity 101 Trainer
- EnvironmentalWorks, DEI Consultant and Trainer
- Arc of King County, Autism Interdialogues Collaborator
- Seattle Office of Civil Rights, Racial Equity Toolkit Consultant Taskforce
- Washington State Misdemeanor Probation Officers Conference, Race and Criminal Justice Presentation
- Casa Latina, Volunteer Appreciation Training – Intersectionality 101 and Narrative Identity
- University Prep Seattle, Intersectionality 101 Training & Ethnic Hair Care Lab
- Harborview Medical Center: Madison Clinic, Homeless Navigation and CEA workshop
- Bailey Boushay House, Housing Navigation and Strategy presentation
- Womxn's Act on Seattle, Narrative Identity Development for White Allyship training
- Unloop, Intersectionality 101 Training
- GeekGirlCon, Youth Empowerment Arts Workshop
- Seattle University: Office of Multicultural Affairs, Diversity and Equity Education Project
- Seattle University: African American Alumni Society, Black and Brown Career Panel
- Seattle University Graduate Student Council: Social Justice Week, Disabilities Power Speech
- Rooted in Rights WA, Mental Health and Gun Violence Advocacy Panel
- NAMI WA, Storyteller and Conference Presenter
- College Access Now, Chief Sealth High School Career Panelist

Epiphanies of Equity: Education & Consulting

ChrisTiana ObeySumner, MNPL

[redacted]

Community and Social Engagement

- **Seattle City Council Candidate,** *Seattle Seat 8, (2017)*: Voted 2nd out of 13 candidates in straw poll
- **Co-Chair, Seattle Disabilities Commission,** *1st term, 2018 – present:* 1st POC elected co-chair
- **Housing Cmte. Chair, Seattle Disabilities Commission,** *1st term, 2015- Present*
- **City Comm'r, Seattle Disabilities Commision,** *2nd term, 2013-Present*
- **City Comm'r, Seattle Renters Comm.** *1st term, 2017-Present*
- **Co-Chair, Seattle Renters Comm.** *2018-Present*
- **Commissioner, King County Transit Advisory Council.** *2018-Present*
- **City Appointed Think Tank Member, Seattle Housing and Livability Agenda,** *2016-2017*
- **Racial, Social, & Economic Justice Rep., Seattle U. Grad. Student Council,** *2016-Present*
- **Co-President , Seattle University Arts and Sciences Graduate Council,** *2015-2016:*
- **Ridesharing Organizer and Disability Advocate, Lyft & Peers.org,** *2013-2015*
- **Co-Organizer, Amplify Voices Rally: Seattle University,** *2012*
- **Founder/President, Tau Sigma Gamma Mu Honor Society, Seattle University,** *2010-2013*

Professional Experience

- **Exec. Dir./Founder, Eleanor Elizabeth Institute for Black Empowerment,** *2017-Present*: Built agile organization providing gap services for empowerment of Black Americans in the PNW. Pioneered State's first Ethnic Hair Care Bank. Promotion of unification for social and racial equity.
- **Housing Navigator, Harborview Medical Center: Madison Clinic,** *May 2016-Dec. 2017*: Designed, managed, and implemented successful Housing Navigator grant initiative. Generated resource network of over 50 community partners, and stabilized over 100 low-to-no income, high-barrier homeless individuals with chronic disabilities in an 18-month period through coaching and specialized formulaic strategy.
- **Clinical Support Specialist, Downtown Emergency Services Center: Canaday House,** *2014-2016*: Headed and won two successful employee/community in-kind donation drives culminating as number one team in the organization. Championed Ethnic Hair Care Salon for Permanent Supportive Housing Residents.
- **Resident Counselor, Compass Housing Alliance: Nyer Urness House,** *2013-2015:* Facilitated peer strategic planning and program development conversations among peers as part of inaugural staff.
- **Community Health Coordinator, Full Life Care: Solstice Behavioral Health—WSC Americorps,** *2013-2014:* Managed Wellness Studio. Directed resource development of in-kind and corporate donations, generating sustainable primary funding and materials for cooking class geared towards low-income, disabled adults; Coordination and training of day volunteers.

Seattle Renters' Commission

15 Members: Pursuant to *Ordinance 125280, all* members subject to City Council confirmation, *2*-year terms:

- *6* City Council-appointed
- *7* Mayor-appointed
- *2* Other Appointing Authority-appointed (specify):

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
6	M	3	1.	Member	Calvin Jones	3/1/18	2/28/20	2	Council
			2.	Member		3/1/19	2/28/21	2	Council
6	F	4	3.	Member	Jessica Westgren	3/1/18	2/28/20	2	Council
6	F	2	4.	Member	Dinah Braccio	3/1/19	2/28/21	1	Council
6	M	2	5.	Member	Mac S. R. McGregor	3/1/18	2/28/20	2	Council
9	F	3	6.	Member	Gina Owens	3/1/19	2/28/21	1	Council
2	F	7	7.	Member	Beverly Aarons	3/1/18	2/28/20	2	Mayor
2	F	3	8.	Member	Laurie Goff	3/1/19	2/28/21	1	Mayor
			9.	Member		3/1/18	2/28/20	2	Mayor
3	F	4	10.	Member	Daniela Lopez	3/1/19	2/28/21	2	Mayor
2	M	3	11.	Member	David W. Mooney	3/1/18	2/28/20	2	Mayor
9	NB	5	12.	Member	ChrisTiana ObeySumner	3/1/19	2/28/21	2	Mayor
6	M	3	13.	Member	Devin Silvernail	3/1/19	2/28/21	1	Commission
9	F	3	14.	Member	Marcedes Taitt-Lamar	3/1/18	2/28/20	1	Commission
2	O	3	15.	Get Engaged Member	Felicia Turner-Murphy	9/1/19	8/31/20	1	Mayor

SELF-IDENTIFIED DIVERSITY CHART

	Male	Female	Transgender /Non-Binary	NB/ O/ U	(1) Asian	(2) Black/ African American	(3) Hispanic/ Latino	(4) American Indian/ Alaska Native	(5) Other	(6) Caucasian/ Non-Hispanic	(7) Pacific Islander	(8) Middle Eastern	(9) Multiracial
Mayor	1	3		2		4	1						1
Council	2	3								4			1
Other	1	1								1			1
Total	4	7		2		4	1			5			3

Key:

***D** List the corresponding *Diversity Chart* number (1 through 9)
****G** List *gender*, **M**= Male, **F**= Female, **T**= Transgender, **NB=** Non-Binary **O=** Other **U**= Unknown
RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01781, **Version:** 1

Reappointment of Laurie Goff as member, Seattle Renters' Commission, for a term to February 28, 2021.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Laurie Goff*		
Board/Commission Name: *Seattle Renter's Commission*		**Position Title:** *Member*
☐ **Appointment** ***OR*** ☒ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ Council ☒ Mayor ☐ Other: *Fill in appointing authority*	**Date Appointed:** *mm/dd/yy*.	**Term of Position: *** 3/1/2019 **to** 2/28/2021 ☒ *Serving remaining term of a vacant position*
Residential Neighborhood: *Capitol Hill*	**Zip Code:** *98101*	**Contact Phone No.:** [redacted]
Background: *Laurie is a pre-school teacher and renter on Capitol Hill. She has worked with families experiencing homelessness due to the rising rents and costs of living in the City. She understands the challenges of living and working in the City. Laurie wants to be a voice for those that are not represented and feels that the Renters' Commission is the perfect opportunity to give back to her community.*		
Authorizing Signature (original signature): Jenny A. Durkan	**Appointing Signatory:** *Jenny A. Durkan* *Mayor of Seattle*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

PROFESSIONAL EXPERIENCE

PROGRAM DEVELOPMENT & MANAGEMENT

- Experience with quantitative and qualitative data collection; surveys, focus groups, interviews, and analysis.
  - Researched and utilized findings of prior quantitative and qualitative research studies to improve and update existing programs, and create new trainings.
  - Revised and customized training models based on outcomes and community feedback.
  - Developed performance metrics and resources used in identifying key problem areas and issues in community health clinics, then designed and implemented processes to address identified problems.
  - Designed research plans for data gathering and analysis regarding the relevance and knowledge retention of program. Increased the knowledge retention from pre to post test 25%.
- Created a master calendar for substitute teacher requests and placement. This allowed relevant school personnel to view in real time, sub requests both pending and filled. Enabling the smooth coordination of sub assignments.
- Curriculum and program materials development.
  - Directed and managed the development and production of teacher guilds, brochures, flyers and direct mail materials.

    Provided varied educational opportunities using multiple learning styles for children's active participation in learning; Together with co-teachers, developed the classroom themes and topics of inquiry.
  - Created policies and procedures for office activities such as record maintenance, employee files biohazard removal, OSHA and health department regulations, purchasing, and employee payroll.
- Responsible for identifying, planning and executing needs for training, performance, educational programs, while locating and recommending available resources to attain organizations objectives and enhance employee development.
- Managed summer contract with the City of Seattle's Youth Employment Program for, Seattle Youth Garden Works. Resulting in the extension of the contract from a summer program to a year round program.
- Managed a comprehensive theater-based youth development program for school age children and administered and set strategic direction of highly visible, multi faceted projects, and supervised the work of outside consultants.
- Oversight of all aspects of staff performance; performance evaluation, progressive discipline, mediation of staff disputes and grievance procedures in accordance with state and federal laws.
- Hired, directed, and supervised a staff of five health educator/performers, established review, and evaluation procedures for staff work product.
- Supervised a multi disciplinary team of ten, consisting of sales associates, registered nurses, and doctors.
- Monitored, and justified budgetary expenditures, assured the coordination of program policies, production schedules, and weekly meetings.
- Responsible for implementing and maintaining compliance with all government and personnel policies, procedures and regulations with the responsibility of ensuring all contracts, reports and forms were completed properly and on time.

OUTREACH & TRAINING

- Skilled in building community support, key coalitions, and strategic interagency partnerships.
  - Cultivated and managed key relationships within Los Angeles County including; key school administrators, community groups, county and city departments.
  - Worked with cross-cultural communities conducting recruitment and networking events.
  - Trained and motivated volunteers taught basic canvassing and organizing skills for community groups and political campaigns.
  - Recruited and established an auxiliary board of community leaders, parents, school officers and students for creation of youth driven prevention programs.
  - Developed a strong working relationship with the Los Angeles City HIV/AIDS Coordinator's Office facilitating collaboration on a grant application.
  - Managed campaign logistics and volunteers for the re-election campaign of Senator Patty Murray in the Columbia City, Mount Baker and Seward Park areas of Seattle, WA.
- Strong public presenter--Have made public presentations to community groups, medical personnel, educators and international health organizations.
- Planned, evaluated, and presented professional education workshops for clinic staff and non-agency professionals.
- Extensive experience in all aspects of creating and implementing training programs on; conflict resolution, sexually transmitted diseases, sexuality/reproductive health, and other health issues for professionals, staff, and patients.
  - Managed a multi – course HIV/AIDS education program for high and middle schools in the Los Angeles Unified School District.
  - Conceived, researched, authored, and supervised the HIV/AIDS training program for testing and notification counselors in 12 community health clinics.
  - Implemented and ran training sessions on OSHA and HIPPA compliance issues and health department regulations for Medical Spa employees.
  - Trained personnel in all areas of front desk management and patient relations, ensuring open lines of communication between patients, staff, physicians, and nurse practitioner with demonstrated efficiency and confidentiality.
- Seasoned trainer of organizational policies and standards to employees and related parties.
  - Provided training on human resources policies, programs, practices, and procedures for current employees.
  - Developed and coordinated training seminars, workshops, and staff retreats. Created content and agenda, orchestrated logistics, and facilitated training.
  - Provided training in the areas of culturally relevant services, professional ethics, and law, and areas of professional development as requested by staff members.
- Provided ongoing orientation for new substitutes, providing information and guidance on how best to work in the school environment.

EMPLOYMENT

Classroom Teacher – Interlaken Preschool, Seattle, WA	2017 - Present
Classroom Teacher – Wellspring Family Services, Seattle, WA	2015 - 2017
Summer Camp Coordinator/Lead, Jewish Day School, Bellevue, WA	2015
Preschool Teacher, Stroum Jewish Community Center, Seattle, WA	2013 - 2015
Summer School Teacher – Hamlin Robinson School, Seattle, WA	2013
Extended Day Teacher / Substitute Coordinator – Giddens School, Seattle, WA	2011 - 2012
Office /Marketing Manager – DiversityCentral.com, Seattle, WA	2008
Associate Director – Seattle Youth Garden Works, Seattle, WA	2006
Program Coordinator – Kaiser Permanente Educational Theatre, Los Angeles, CA	2005 - 2006
Coordinator of Training / Clinic Trainer - Planned Parenthood, Los Angeles, CA	2002 - 2004

EDUCATION, CERTIFICATION

STARS/MERIT Certification
CPR/First Aid/BBP
Food Handlers Permit
Training Specialist Certificate – The University of Washington – 2009
B.A. Liberal Arts – The Evergreen State College, Olympia Washington – 1992

Seattle Renters' Commission

15 Members: Pursuant to *Ordinance 125280, all* members subject to City Council confirmation, *2*-year terms:

- *6* City Council-appointed
- *7* Mayor-appointed
- *2* Other Appointing Authority-appointed (specify):

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
6	M	3	1.	Member	Calvin Jones	3/1/20	2/28/22	1	Council
			2.	Member		3/1/19	2/28/21	2	Council
6	F	4	3.	Member	Jessica Westgren	3/1/18	2/28/20	2	Council
6	F	2	4.	Member	Dinah Braccio	3/1/19	2/28/21	1	Council
6	M	2	5.	Member	Mac S. R. McGregor	3/1/20	2/28/22	1	Council
9	F	3	6.	Member	Gina Owens	3/1/19	2/28/21	1	Council
			7.	Member		3/1/18	2/28/20	2	Mayor
2	F	3	8.	Member	Laurie Goff	3/1/19	2/28/21	2	Mayor
			9.	Member		3/1/18	2/28/20	2	Mayor
3	F	6	10.	Member	Daniela Lopez	3/1/19	2/28/21	2	Mayor
			11.	Member		3/1/18	2/28/20	2	Mayor
9	NB	5	12.	Member	ChrisTiana ObeySumner	3/1/19	2/28/21	2	Mayor
			13.	Member		3/1/19	2/28/21	1	Commission
9	F	3	14.	Member	Marcedes Taitt-Lamar	3/1/19	2/28/21	2	Commission
			15.	Get Engaged Member		9/1/19	8/31/20	1	Mayor

SELF-IDENTIFIED DIVERSITY CHART

	Male	Female	Transgender /Non-Binary	NB/ O/ U	Asian (1)	Black/ African American (2)	Hispanic/ Latino (3)	American Indian/ Alaska Native (4)	Other (5)	Caucasian/ Non-Hispanic (6)	Pacific Islander (7)	Middle Eastern (8)	Multiracial (9)
Mayor	0	2		1		1	1						1
Council	2	3								4			1
Other	0	1											1
Total	2	6		1		1	1			4			3

Key:

***D** List the corresponding *Diversity Chart* number (1 through 9)
****G** List *gender*, **M**= Male, **F**= Female, **T**= Transgender, **NB=** Non-Binary **O=** Other **U**= Unknown
RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01782, **Version:** 1

Reappointment of Marcedes T. Taitt-Lamar as member, Seattle Renters' Commission, for a term to February 28, 2022.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: *Marcedes T. Taitt-Lamar*		
Board/Commission Name: *Seattle Renters' Commission*		**Position Title:** *Member*
☐ **Appointment** ***OR*** ☒ **Reappointment**	**Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☐ Council ☐ Mayor ☒ Other: *Commission*	**Date Appointed:** *mm/dd/yy*.	**Term of Position: *** 3/1/2020 **to** 2/28/2022 ☐ *Serving remaining term of a vacant position*
Residential Neighborhood: *Central District*	**Zip Code:** *98144*	**Contact Phone No.*:*** *Business phone # - NOT personal phone #*

Background:

Marci Taitt is Seattle born and south-end raised, currently residing in Seattle's Central District. She has deep familial roots in the Central District neighborhood and is passionate about Seattle, especially the CD, being affordable and accessible for Disabled, QTPOC communities. She currently does anti-violence policy work in LGBTQ communities, coordinating trainings across the country that support domestic violence advocates to better serve LGBTQ survivors of domestic and sexual violence. Marci completed her Master of Social Work at the University of Washington, with a concentration in mental health practice and a research focus on trans-inclusive primary education. While much of her work and volunteer experience has been in local grassroots LGBTQ organizations and movements, Marci is also interested in the alternative death care industry and hopes to soon develop a workshop around activism, death in community and grief.

Authorizing Signature (original signature): X	**Appointing Signatory:** *Dinah Braccio* *Commission Co-Chair*
Authorizing Signature (original signature): X	**Appointing Signatory:** *Jessica Westgren* *Commission Co-Chair*

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Marcedes T. Taitt-Lamar, MSW

[redacted]

SUMMARY OF QUALIFICATIONS

Masters of Social Work (MSW) with a mental health concentration & Community Psychology major (BA) with experience in practice & research-oriented coursework. Social research conducted abroad demonstrates ability to adapt & work in international environments & culturally diverse communities. Practical understanding of & experience in the facilitation of support groups. Extensive training and technical assistance coordination experience with emphasis in providing advocacy to lesbian, gay, bisexual and transgender survivors of domestic and sexual violence.

EDUCATION

Masters of Social Work, Mental Health Practice **June 2015**
University of Washington, Seattle

Bachelor of Arts in Community Psychology **March 2013**
University of Washington, Bothell
Honors: Annual Dean's List recipient 2009-2013, Cum Laude

EXPERIENCE

Institute Coordinator, The National LGBTQ Institute on Intimate Partner Violence
The NW Network of Bisexual, Transgender, Lesbian & Gay Survivors of Abuse **October 2016-*present***

- Planning & coordinating steering committee meetings, programmatic invoicing and reimbursements
- National LGBTQ Institute project partner communications
- Coordination of the National LGBTQ Institute's national training and technical assistance efforts, including a national two-day advocacy training summit for DV/SA advocates across the US
- Coordination of the NW Network's training and technical assistance initiative
- Manage programmatic reporting to federal, state and city grants
- Co-facilitate the NW Network's weekly all gender domestic violence support group for LGBTQ survivors of DV/SA
- Supervise and support University of Washington MSW students in their practicum placement at the NW Network. Connect students' on-site tasks to coursework and program competencies. Provide students with the NW Network's framing for supporting LGBTQ survivors of DV/SA, incorporate trauma stewardship practices into a model of advocacy and exposure to vicarious trauma

Program Specialist, Capacity Building Learning Center
The NW Network of Bisexual, Transgender, Lesbian & Gay Survivors of Abuse **June 2015-October 2016**

- Planning & coordinating convening of the National LGBTQ DV Capacity Building Learning Center (LGBTQ DV CBLC) steering committee meetings
- National LGBTQ DV CBLC steering committee & partner communications
- National LGBTQ DV CBLC steering committee invoicing & reimbursements
- Technical assistance for webinars including up to 200+ participants via the iLinc webinar platform

Youth Team Intern
The NW Network of Bisexual, Transgender, Lesbian & Gay Survivors of Abuse **September 2014-June 2015**

- Facilitate and develop agendas for gay-straight alliance group at local high school
- Support community engagement events and programmatic outreach

Domestic Violence Protection Order Advocate
King County Prosecuting Attorney's Office Protection Order Advocacy Program **January 2014-June 2014**

- Worked with a team of advocates to provide legal advocacy to survivors of domestic violence filing for civil protection orders. Assisted petitioners with criminal justice system referral resources, safety planning, community-based/culturally-specific resources and in-court advocacy

Volunteer
Gay City Wellness Center **April 2013-January 2014**

- Greeted clients, scheduled appointments, & processed health information paperwork for people seeking to get tested at the HIV & STI prevention center

Studies Abroad

Urban & Rural Livelihoods and the Story of Economic Development **August-September 2011**
University of Washington, Zambia, Africa

Dark Empire: Race, Health and Society in Britain **August-September 2014**
University of Washington, London, England

Community Organizing and Memberships

miXed @ UW, Administrator	**2016-*present***
UWB National Society of Collegiate Scholars, Member	**2010-2013**
UWB African American Student Union, Member	**2009**

Exceptional Skills

Technical Proficiencies Adobe Connect teleconferencing platform, technical support on 50+ training & technical assistance webinars including up to 200+ participants, Adobe Photoshop CS, Microsoft Office Suite

Seattle Renters' Commission

15 Members: Pursuant to *Ordinance 125280, all* members subject to City Council confirmation, *2*-year terms:

- *6* City Council-appointed
- *7* Mayor-appointed
- *2* Other Appointing Authority-appointed (specify):

Roster:

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			2.	Member		3/1/19	2/28/21		Council
6	F	4	3.	Member	Jessica Westgren	3/1/18	2/28/20	2	Council
6	F	2	4.	Member	Dinah Braccio	3/1/19	2/28/21	1	Council
6	M	2	5.	Member	Mac S. R. McGregor	3/1/20	2/28/22	1	Council
9	F	3	6.	Member	Gina Owens	3/1/19	2/28/21	1	Council
			7.	Member		3/1/20	2/28/22		Mayor
2	F	3	8.	Member	Laurie Goff	3/1/19	2/28/21	2	Mayor
			9.	Member		3/1/20	2/28/20		Mayor
3	F	6	10.	Member	Daniela Lopez	3/1/19	2/28/21	2	Mayor
			11.	Member		3/1/20	2/28/22		Mayor
9	NB	5	12.	Member	ChrisTiana ObeySumner	3/1/19	2/28/21	2	Mayor
9	F	3	13.	Member	Marcedes T. Taitt-Lamar	3/1/20	2/28/22	2	Commission
			14.	Member		3/1/19	2/28/21		Commission
6	F	2	15.	Get Engaged Member	Chloe Caswell	9/1/20	8/31/21	1	Mayor

SELF-IDENTIFIED DIVERSITY CHART

	Male (1)	Female (2)	Transgender /Non-Binary (3)	NB/ O/ U (4)	Asian (5)	Black/ African American (6)	Hispanic/ Latino (7)	American Indian/ Alaska Native (8)	Other (9)	Caucasian/ Non-Hispanic	Pacific Islander	Middle Eastern	Multiracial
Mayor	0	3		1		1	1						1
Council	2	3								5			1
Other	0	1											1
Total	2	7		1		1	1			5			3

Key:

***D** List the corresponding *Diversity Chart* number (1 through 9)
****G** List *gender*, **M**= Male, **F**= Female, **T**= Transgender, **NB=** Non-Binary **O=** Other **U**= Unknown
RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01783, **Version:** 1

Appointment of Sharon E. Crowley as member, Seattle Renters' Commission, for a term to February 28, 2022.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: Sharon E. Crowley		
Board/Commission Name: *Seattle Renters' Commission*		**Position Title:** *Member*
☒ **Appointment** ***OR*** ☐ **Reappointment**	**City Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☒ City Council ☐ Mayor ☐ Other: *Fill in appointing authority*	**Term of Position: *** 3/1/2020 **to** 2/28/2022 ☒ *Serving remaining term of a vacant position*	
Residential Neighborhood: *Council District 6*	**Zip Code:** *98107*	**Contact Phone No.*:*** [redacted]

Background:
As an organizer and long-time member of UAW Local 4121, Sharon Crowley has organized and coordinated organizing on three successful external organizing drives. She believes that it is deeply rewarding to win - and to help other workers win - stronger rights and protections enshrined in a collective bargaining agreement (CBA). Since returning to work for 4121 in 2016, Sharon has been a member of her union local's Housing Justice Workgroup (HJWG), which was involved in the Tax Amazon movement to fight for green, affordable, union-built social housing for all working people in Seattle. As a member of our HJWG, Sharon also helped to organize a Tenant Rights Bootcamp with Be:Seattle, and plans to hold additional Bootcamps in the future. Sharon states that she would like to be part of the Renters Commission to build on the work that she has been involved with in her workgroup and the Tax Amazon movement, to help fight for renters rights and housing justice for all who live and work in the City of Seattle.

Authorizing Signature (original signature): **Date Signed (appointed):** **1/25/21**	**Appointing Signatory:** *Kshama Sawant* *Seattle City Councilmember, District 3*

**Term begin and end date is fixed and tied to the position and not the appointment date.*

Sharon E Crowley

[redacted] [redacted]
[redacted]

Selected Experience and Qualifications:

- Experienced union organizer and office manager with experience coordinating organizing work across departments and bargaining units. Detail-oriented bookkeeper and purchasing manager.
- Accomplished educator and communicator with excellent verbal and written presentation capability. Talent for pitching content across disciplinary boundaries, finding creative ways to explain difficult material, understanding and responding flexibly to audience needs.
- Fluent in analytical methods, evidence practices, and style guide implementation across disciplines.
- Computer Skills:_ Highly proficient in MS Office and Access; online learning platforms (Canvas, Blackboard, Catalyst, Tegrity, Panopto, Google Apps, etc.). Additional background with web design (Dreamweaver, HTML) and layout software (InDesign and Publisher). Adept at learning new platforms and translating materials across platforms.

Work History:

Organizer and Office Manager, UAW Local 4121 **October 2016 – Present**

- Coordinate internal and external organizing with graduate and postdoctoral researchers. Lead issues-focused member work groups in developing projects related to housing justice, healthcare, and the local union budget. Manage office purchasing, contracting and bookkeeping.

Contract Organizer, SEIU Local 925 **July 2015 – June 2016**

- Developed and implemented campaign strategy on a small university campus. Built and coordinated an 8-member organizing committee. Honed project planning and interviewing skills.

Predoctoral Lecturer, University of Washington (Bothell campus) **March 2007 – June 2015**

- Designed, planned, and implemented traditional and hybrid courses. Developed syllabuses, curated content, and wrote all instructional tools. Delivered instruction in class and small group conferences. Developed rubrics to assess student learning and performance.
- Completed Hybrid Course Design Institute (HCDI) program.
- Redesigned curriculum and learning outcomes for the undergraduate composition program, on committee with other composition faculty.

Teaching Assistant, University of Washington (Seattle campus) **October 2001 – June 2007**

- Designed, planned, and implemented all aspects of composition and literature courses. Provided computer-integrated classroom instruction.

Organizer and Recording Secretary, UAW Local 4121 (Seattle, WA) **October 2001 – February 2007**

- Contributed to central campaign strategy development. Trained and coordinated organizers.
- Wrote membership communications. Built and managed databases (MS-Access). Designed bargaining survey instruments. Analyzed qualitative data and developed bargaining proposals and strategies.

Project Manager, T-Mobile (for Pace Staffing) (Bellevue, WA) **June 2002-September 2002**

- Managed East Coast regional signage changeover as part of a global corporate rebranding project.
- Mediated between clients and vendors to resolve signage quality disputes. Designed and managed database for tracking issues and resolutions (MS Excel and Access).

Contract Writer, University of Vermont College of Medicine (Burlington, VT) **June 2000-September 2000**

- Developed content, wrote and edited copy for the Vermont Area Health Education Center (AHEC) career guide for HS students. Collaborated on product design and layout using MS Publisher. Planned events and designed publicity for the UVM College of Medicine.

Lecturer and Graduate Teaching Fellow, University of Vermont **September 1998-January 2001**

- Designed, planned, and implemented all aspects of composition and literature courses. Provided computer-integrated classroom instruction.

Laboratory Technician, Haematologic Technologies, Inc. (Essex Jct. VT) **September 1994-January 1996**

- Performed laboratory procedures and quality control to produce research-grade purified protein products.
- Managed shipping department. Re-designed inventory management systems and shipping processes.
- Trained new employees in laboratory, inventory, and shipping best practices.

Education:

University of Washington (Seattle) **Doctoral Candidate, English**

- President, English Graduate Student Organization

University of Vermont (Burlington) **Master of Arts, English**

- Phi Beta Kappa, Alpha of Vermont
- President, English Graduate Student Association
- Benjamin Wainwright Award for Creative Writing

Michigan State University (East Lansing) **Bachelor of Science, Biology - Lyman Briggs College**

- Recipient, NSF REU grant
- Golden Key National Honor Society

Seattle Renters' Commission

15 Members: Pursuant to *Ordinance 125280, all* members subject to City Council confirmation, *2*-year terms:

- *6* City Council-appointed
- *7* Mayor-appointed
- *2* Other Appointing Authority-appointed (specify):

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
6	M	3	1.	Member	Calvin Jones	3/1/20	2/28/22	1	Council
6	F	4	2.	Member	Maya Garfinkel	3/1/21	2/28/23	1	Council
6	F	6	3.	Member	Sharon E. Crowley	3/1/20	2/28/22	1	Council
6	F	2	4.	Member	Dinah Braccio	3/1/19	2/28/21	1	Council
6	M	2	5.	Member	Mac S. R. McGregor	3/1/20	2/28/22	1	Council
9	F	3	6.	Member	Gina Owens	3/1/19	2/28/21	1	Council
			7.	Member		3/1/20	2/28/22		Mayor
2	F	3	8.	Member	Laurie Goff	3/1/19	2/28/21	2	Mayor
			9.	Member		3/1/20	2/28/20		Mayor
			10.	Member		3/1/19	2/28/21		Mayor
			11.	Member		3/1/20	2/28/22		Mayor
9	NB	5	12.	Member	ChrisTiana ObeySumner	3/1/19	2/28/21	2	Mayor
9	F	3	13.	Member	Marcedes T. Taitt-Lamar	3/1/20	2/28/22	2	Commission
			14.	Member		3/1/19	2/28/21		Commission
6	F	2	15.	Get Engaged Member	Chloe Caswell	9/1/20	8/31/21	1	Mayor

SELF-IDENTIFIED DIVERSITY CHART

	Male	Female	Transgender /Non-Binary	NB/ O/ U	Asian	Black/ African American	Hispanic/ Latino	American Indian/ Alaska Native	Other	Caucasian/ Non-Hispanic	Pacific Islander	Middle Eastern	Multiracial
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
Mayor	0	2		1		1				1			1
Council	2	4								5			1
Other	0	1											1
Total	2	7		1		1				6			3

Key:

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****G** List *gender*, **M**= Male, **F**= Female, **T**= Transgender, **NB=** Non-Binary **O=** Other **U**= Unknown
RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

Legislation Text

File #: Appt 01784, **Version:** 1

Appointment of Maya Garfinkel as member, Seattle Renters' Commission, for a term to February 28, 2023.

The Appointment Packet is provided as an attachment.

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name: Maya Garfinkel		
Board/Commission Name: *Seattle Renters' Commission*		**Position Title:** *Member*
☒ **Appointment** ***OR*** ☐ **Reappointment**	**City Council Confirmation required?** ☒ Yes ☐ No	
Appointing Authority: ☒ City Council ☐ Mayor ☐ Other: *Fill in appointing authority*	**Term of Position: *** 3/1/2021 **to** 2/28/2023 ☐ *Serving remaining term of a vacant position*	
Residential Neighborhood: *Council District 4*	**Zip Code:** *98115*	**Contact Phone No.*:*** [redacted]
Background: As an organizer with Be:Seattle, Maya Garfinkel has advocated for tenants and organized for greater renter protections. Maya has worked with tenants across Seattle to connect them with resources, assert their rights with landlords, and brainstorm how to better connect with their neighbors. As a part of the Cancel Rent and Mortgages Washington campaign, Maya has collaborated with the Tenants Union of Washington and other community groups to push for renters' issues to be a legislative priority. Maya states that she would like to be part of the Renters Commission to ensure that Seattle fights for renters to live and stay in the city by increasing enforcement potential and strengthening tenant protections.		
Authorizing Signature (original signature): **Date Signed (appointed):** **1/25/21**	**Appointing Signatory:** *Kshama Sawant* *Seattle City Councilmember, District 3*	

**Term begin and end date is fixed and tied to the position and not the appointment date.*

MAYA GARFINKEL

[redacted]

EDUCATION

Barnard College, Columbia University May 2019
B.A. in History (Concentration in Gender, Sexuality, and the Family and the Study of Race and Ethnicity)
Honors: Phi Beta Kappa, Magna Cum Laude, thesis awarded distinction

PROFESSIONAL AND ORGANIZING EXPERIENCE

Be:Seattle April 2020- Present
Tenant Organizer

- Create and facilitate online tenant know your rights workshops regarding emergency and pre-existing tenant laws, as well as introductory organizing strategy
- Testify and organize others to voice their support for Seattle pro-tenant legislation
- Engage with state-wide organizations for the Washington Cancel Rent campaign with allied tenant groups and assist in strategy for direct action, legislative approach, and social media plan

UNITE HERE Local 8 October- November 2019
Political Canvasser

- Engaged with 100+ Seattle voters daily in District 7 regarding housing affordability, the head tax, and homelessness
- Trained new canvassers on how to relate personal stories with the city council election and voter engagement

Lopez Community Land Trust August- October 2019
Sustainable Agriculture Intern

- Contributed to the Lopez Island Farm Education program by assisting in managing 30+ volunteers, executing twice daily meal plans which utilize locally-produced ingredients for staff and students, and maintaining a sustainable garden which produces 9,000 pounds of food each year
- Created lesson plans for students aged 5-18 to learn about land stewardship, nutrition, and sustainable agriculture at the garden as well as neighboring farms

Make the Road New York June-December 2018
Campaign and Research Intern

- Reviewed academic and community-based approaches to measuring nonprofit effectiveness in order to strengthen the organization's systems of internal evaluation
- Researched the 2020 Census and New York Regional Economic Development Councils for immigrants and low-income people of color used in reports for media outlets
- Collected over 900 signatures for progressive local candidates across New York City
- Canvassed and directly communicated with 100+ volunteers for campaign and community events

American Civil Liberties Union January-August 2017
Intern at Trone Center for Criminal Justice Reform

- Created a literature review on the history and impacts of electronic monitoring in probation and parole for internal research and policy
- Completed background research on the common themes of criminality, working class division, and conservative backlash throughout history for presentations across the country by Director of Trone Center Jeff Robinson

Student Worker Solidarity September 2015- Fall 2018
Student Organizer

- Communicated with and advocated for workers across Columbia on working conditions and waged campaigns including for $15/hour minimum wage for student workers

Seattle Renters' Commission

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6	F	2	4.	Member	Dinah Braccio	3/1/19	2/28/21	1	Council
6	M	2	5.	Member	Mac S. R. McGregor	3/1/20	2/28/22	1	Council
9	F	3	6.	Member	Gina Owens	3/1/19	2/28/21	1	Council
			7.	Member		3/1/20	2/28/22		Mayor
2	F	3	8.	Member	Laurie Goff	3/1/19	2/28/21	2	Mayor
			9.	Member		3/1/20	2/28/20		Mayor
			10.	Member		3/1/19	2/28/21		Mayor
			11.	Member		3/1/20	2/28/22		Mayor
9	NB	5	12.	Member	ChrisTiana ObeySumner	3/1/19	2/28/21	2	Mayor
9	F	3	13.	Member	Marcedes T. Taitt-Lamar	3/1/20	2/28/22	2	Commission
			14.	Member		3/1/19	2/28/21		Commission
6	F	2	15.	Get Engaged Member	Chloe Caswell	9/1/20	8/31/21	1	Mayor

SELF-IDENTIFIED DIVERSITY CHART

	Male	Female	Transgender /Non-Binary	NB/ O/ U	Asian	Black/ African American	Hispanic/ Latino	American Indian/ Alaska Native	Other	Caucasian/ Non-Hispanic	Pacific Islander	Middle Eastern	Multiracial
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
Mayor	0	2		1		1				1			1
Council	2	4								5			1
Other	0	1											1
Total	2	7		1		1				6			3

Key:

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