CITY OF SEATTLE

ORDINANCE _____

COUNCIL BILL _____

..title
AN ORDINANCE relating to the Seattle Electrical Code; amending Section 22.300.016 of the Seattle Municipal Code; adopting the 2017 National Electrical Code with Seattle amendments; adopting by incorporation specific portions of the 2017 Washington Administrative Code Chapter 296-46B (Washington State Electrical Rule); and repealing Sections 3 through 43 of Ordinance 124593.
..body
BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. Section 22.300.016 of the Seattle Municipal Code, last amended by Ordinance 124593, is amended as follows:

22.300.016 Adoption of the Electrical Code ((.))

The *Seattle Electrical Code* ((,)) consists of portions of the *National Electrical Code,* ((~~2014~~)) 2017 edition, ((~~published by the National Fire Protection Association~~)); selected portions of the ((~~2014~~)) 2017 edition of ((~~the~~)) *Washington Administrative Code* (WAC) Chapter 296-46B, copies of which are filed with the City Clerk in ((~~C.F. 313965 and C.F. 313966~~)) Clerk Files 320384 and 320385; amendments, including deletions and additions, to the ((~~2014~~)) *2017 National Electrical Code* and the selected portions of WAC 296-46B; and ((~~Chapter 80~~)) Article 80, relating to administration, permitting, and enforcement, ((~~are~~)) as adopted by ((~~this ordinance~~)) the ordinance introduced as Council Bill 119069.

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Section 2. Sections 3 through 43 of Ordinance 124593 are hereby repealed.

Section 3. The following sections of Article 80 are adopted to read as follows:

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 2017 amending the 2017 *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. 2017 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) 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, and 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 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) services or feeders of 400 amperes or over;

(b) switches, circuit breakers, 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 WAC 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 shall submit plans and specifications, including system layout and all system components at the time of application; and

(3) systems rated under 7.7 kW shall provide a one line drawing and manufacturer's installation requirements to the field inspector prior to the first cover inspection

(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.

(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.*

(F) 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.

(G) 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), 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.

Section 4. The following sections of Article 90 of the *National Electrical Code*, 2017 Edition, are amended as follows:

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) 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 and raceways 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~~

~~(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.~~))

* * *

Section 5. The following sections of Article 100 of the National Electrical Code, 2017 Edition, are amended as follows:

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.~~))

* * *

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-2012, *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-4)

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.

Section 6. The following sections of Article 110 of the *National Electrical Code*, 2017 Edition, are amended as follows:

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 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 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.

Informational Note No. 1: WAC 296-46B-110(011), requirements for electrical equipment and wiring submerged or exposed to water, is incorporated herein.

* * *

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.

~~(((**(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 110.21(B) 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. One or more markings shall be applied at the site to equipment identified in 110.16(A) to identify specific arc flash hazard(s). The marking shall be an identification plate

or label meeting ANSI Standards Z535.4-2011 or be of a type approved by the authority having jurisdiction or designated representative. The plate or label may be mounted using adhesive. The plate or label shall include the name of company or individual responsible for the analysis, the date of the analysis, and all of the following as identified in NFPA 70E 130.5(D):

(1) Nominal system voltage

(2) Arc flash boundary

(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 personal protective equipment

Exception (1): 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*-2015, *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*-2015 *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.

N **(((~~(2)~~))) (1) 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 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.

Informational Note: Industry standards are available for application of reconditioned and refurbished equipment. Normal servicing of equipment that remains within a facility should not be considered reconditioning or refurbishing.

(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 hand written.

Exception to (2): Portions of labels or markings that are variable, or that could be subject to changes, shall be permitted to be hand written 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 in 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 6 mm (¼ in.) high and the letters shall be in contrast to the background. Marking or labeling shall be affixed using of one of the following materials:

(1) Identification Plate. Where an identification plate is required, it shall be made of phenolic, metallic, or other similar rigid-plate material, engraved with block letters and affixed by screws, rivets, permanent adhesive, or other methods required in this *Code.*

(2) Adhesive Sticker. When an identification plate is not required, an adhesive sticker may be used. The sticker shall have permanent lettering and have an adhesive that securely and permanently affixes the sticker.

Exception to (C): Manufacturer's marking shall not be required to have lettering of not less than 6 mm (¼ in.).

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. 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 dwelling units, 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.

* * *

Part II. 1,000 Volts, Nominal, or Less

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 1,000 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-2015, *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.

(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.

(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 (6½ ft) or the height of the equipment, whichever is greater. Within the height requirements of this section, other equipment that is associated with the electrical installation and is 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: In existing dwelling units, service equipment or panelboards that do not exceed 200 amperes shall be permitted in spaces where the height of the working space is less than 2.0 m (6½ ft).~~))

Exception No. ((~~2~~)) 1: 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.

Exception No. ((~~3~~)) 2: On battery systems mounted on open racks, the top clearance shall comply with 480.10(D).

N **(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:

Table 110.26(A)(1) Working Spaces

Nominal Voltage to Ground	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
0—150	900 mm (3 ft)	900 mm (3 ft)	900 mm (3 ft)
151—600	900 mm (3 ft)	1.0 m (3 ft 6 in.)	1.2 m (4 ft)
601—1,000	900 mm (3 ft)	1.2 m (4 ft)	1.5 m (5 ft)

Note: Where the conditions are as follows:

Condition 1—Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

Condition 2—Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

Condition 3—Exposed live parts on both sides of the working space.

(a) 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.).

(b) 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.

(c) All enclosure doors or hinged panels shall be capable of opening a minimum of 90 degrees.

(d) 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.

N **(5) Separation from High-Voltage Equipment.** Where switches, cutouts, or other equipment operating at 1,000 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 equipment rated 1,200 amperes or more and over 1.8 m (6 ft) wide 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 (6½ ft) high at each end of 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 A 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.

(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 only shall not be permitted. 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), Exception No. 1, for switched receptacles.

(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.

(2) Outdoor. Outdoor installations shall comply with 110.26(E)(2)(a) through (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.

Exception: Structural overhangs or roof extensions shall be permitted 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.

(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.

* * *

Part III. Over 1,000 Volts, Nominal

110.30 General. Conductors and equipment used on circuits over 1,000 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 the provisions of 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 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.

110.31 Enclosure for Electrical Installations. Electrical installations in a vault, room, or closet or in an area surrounded by a wall, screen, or fence, access to which is controlled by a lock(s) or other approved means, shall be considered to be accessible to qualified persons only. The type of enclosure used in a given case shall be designed and constructed according to the nature and degree of the hazard(s) associated with the installation.

For installations other than equipment as described in 110.31(D), a wall, screen, or fence shall be used to enclose an outdoor electrical installation to deter access by persons who are not qualified. A fence shall not be less than 2.1 m (7 ft) in height or a combination of 1.8 m (6 ft) or more of

fence fabric and a 300 mm (1 ft) or more extension utilizing three or more strands of barbed wire or equivalent. The distance from the fence to live parts shall be not less than given in Table 110.31.

Informational Note: See Article 450 for construction requirements for transformer vaults.

(A) Electrical Vaults. Where an electrical vault is required or specified for conductors and equipment 110.31(A)(1) to (A)(5) shall apply.

(1) Walls and Roof. The walls and roof shall be constructed of materials that have adequate structural strength for the conditions, with a minimum fire rating of 3 hours. For the purpose of this section, studs and wallboard construction shall not be permitted.

(2) Floors. The floors of vaults in contact with the earth shall be of concrete that is not less than 102 mm (4 in.) thick, but where the vault is constructed with a vacant space or other stories below it, the floor shall have adequate structural strength for the load imposed on it and a minimum fire resistance of 3 hours.

(3) Doors. 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 to (1), (2), and (3): Where the vault is protected with automatic sprinkler, water spray, carbon dioxide, or halon, construction with a 1-hour rating shall be permitted.

(4) Locks. Doors shall be equipped with locks, and doors shall be kept locked, with access allowed only to qualified persons. Personnel doors shall swing out and be equipped with panic bars, pressure plates, or other devices that are normally latched but that open under simple pressure.

(5) Transformers. Where a transformer is installed in a vault as required by Article 450, the vault shall be constructed in accordance with the requirements of Part III of Article 450.

Informational Note No. 1: For additional information, see ANSI/ASTM E119-2015, *Method for Fire Tests of Building Construction and Materials*, and NFPA 80-2016, *Standard for Fire Doors and Other Opening Protectives*.

Section 7. The following sections of Article 200 of the *National Electrical Code*, 2017 Edition, are amended as follows:

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.

Section 8. The following sections of Article 210 of the *National Electrical Code*, 2017 Edition, are amended as follows:

ARTICLE 210

Branch Circuits

* * *

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 (E). 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.

For the purposes of this section, when determining distance from receptacles the distance shall be measured as the shortest path the cord of an appliance connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier, or passing through a door, doorway, or window.

(A) Dwelling Units. All 125-volt, single-phase, 15- and 20-ampere receptacles installed in the locations specified in 210.8(A)(1) through (10) 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 (¼ 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) Unfinished portions or areas of the basement not intended as habitable rooms

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 ¼" high.

Informational Note: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems.

Informational Note: WAC 296-46B-210.008, requirements for GFCI protection in a dwelling unit unfinished basement, is incorporated herein with edits.

Receptacles installed under the exception to 210.8(A) shall not ((~~be considered as meeting~~)) be 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

(B) Other Than Dwelling Units. All single-phase receptacles rated 150 volts to ground or less, 50 amperes or less and three-phase receptacles rated 150 volts to ground or less, 100 amperes or less installed in the following locations shall have ground-fault circuit-interrupter protection for personnel.

(1) Bathrooms

(2) Kitchens

(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 snowmelting, 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)(3) 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): For receptacles located in patient bed locations of general care (Category 2) or critical care (Category 1) spaces of health care facilities other than those covered under 210.8(B)(1), GFCI protection shall not be required.

(6) Indoor wet locations

(7) Locker rooms with associated showering facilities

(8) Garages, service bays, and similar areas other than vehicle exhibition halls and showrooms

(9) Crawl spaces—at or below grade level

(10) Unfinished portions or areas of the basement not intended as habitable rooms

(11) Areas where food and beverage preparation occurs

(C) Boat Hoists. GFCI protection shall be provided for outlets not exceeding 240 volts that supply boat hoists installed in dwelling unit locations.

(D) Kitchen Dishwasher Branch Circuit. GFCI protection shall be provided for outlets that supply dishwashers installed in dwelling unit locations.

N **(E) Crawl Space Lighting Outlets.** GFCI protection shall be provided for lighting outlets not exceeding 120 volts installed in crawl spaces.

* * *

210.11 Branch Circuits Required. Branch circuits for lighting and for appliances, including motor-operated appliances, shall be provided to supply the loads calculated in accordance with 220.10. In addition, branch circuits shall be provided for specific loads not covered by 220.10 where required elsewhere in this *Code* and for dwelling unit loads as specified in 210.11(C).

(A) Number of Branch Circuits. The minimum number of branch circuits shall be determined from the total calculated load and the size or rating of the circuits used. In all installations, the number of circuits shall be sufficient to supply the load served. In no case shall the load on any circuit exceed the maximum specified by 220.18.

(B) Load Evenly Proportioned Among Branch Circuits.

Where the load is calculated on the basis of volt-amperes per square meter or per square foot, the wiring system up to and including the branch-circuit panelboard(s) shall be provided to serve not less than the calculated load. This load shall be evenly proportioned among multioutlet branch circuits within the panelboard(s). Branch-circuit overcurrent devices and circuits shall be required to be installed only to serve the connected load.

(C) Dwelling Units.

(1) Small-Appliance Branch Circuits. In addition to the number of branch circuits required by other parts of this section, two or more 20-ampere small-appliance branch circuits shall be provided for all receptacle outlets specified by 210.52(B).

(2) Laundry Branch Circuits. In addition to the number of branch circuits required by other parts of this section, at least one additional 20-ampere branch circuit shall be provided to supply the laundry receptacle outlet(s) required by 210.52(F). This circuit shall have no other outlets.

(3) Bathroom Branch Circuits. In addition to the number of branch circuits required by other parts of this section, at least one 120-volt, 20-ampere branch circuit shall be provided to supply the bathroom(s) receptacle outlet(s). Such circuits shall have no other outlets.

Exception: Where the 20-ampere circuit supplies a single bathroom, outlets for other equipment within the same bathroom shall be permitted to be supplied in accordance with 210.23(A)(1) and (A)(2).

N **(4) Garage Branch Circuits.** In addition to the number of branch circuits required by other parts of this section, at least one 120-volt, 20-ampere branch circuit shall be installed to supply receptacle outlets in attached garages and in detached garages with electric power. This circuit shall have no other outlets.

Exception: This circuit shall be permitted to supply readily accessible outdoor receptacle outlets.

(D) Adaptable for Living Areas: A raceway system or one dedicated 15-ampere minimum, 120-volt circuit must be taken to all unfinished space areas adaptable to future dwelling unit living areas that are not readily accessible to the service or branch circuit panelboard. One circuit

or raceway is required for each 480 square feet or less of unfinished space. If the total adjacent unfinished space is less than 480 square feet, the circuit can be an extension of an existing circuit. The circuits must terminate in a suitable box(es). The box must contain an identification of the intended purpose of the circuit(s). The branch circuit panelboard must have adequate space and capacity for the intended load(s).

Informational Note: WAC 296-46B-210.011(4) requirements for GFCI protection for unfinished space that is adaptable to living areas is incorporated herein.

* * *

210.12 Arc-Fault Circuit-Interrupter Protection. Arc-fault circuit-interrupter protection shall be provided as required in 210.12(A), (B), ((~~and~~)) (C) and (D). The arc-fault circuit interrupter shall be installed in a readily accessible location.

(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

(2) A 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.

(3) 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.

(4) 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 RMC, IMC, EMT, Type MC, or steel-armored Type AC cables meeting the requirements of 250.118, metal wireways, metal auxiliary gutters, and metal outlet and junction boxes 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: Where an individual branch circuit to a fire alarm system installed in accordance with 760.41(B) or 760.121(B) is installed in RMC, IMC, EMT, or steel-sheathed cable, Type AC or Type MC, meeting the requirements of 250.118, with metal outlet and junction boxes, AFCI protection shall be permitted to be omitted.

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 interupters, 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~~)) the bedrooms, living rooms, hallways, closets, bathrooms, and similar rooms located in 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 and Guest Suites. 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 shall be protected by any of the means described in 210.12(A)(1) through (6).

(D) Branch Circuit Extensions or Modifications—Dwelling Units and Dormitory Units. In any of the areas specified in 210.12(A) or (B), where branch-circuit wiring is modified, replaced, or extended, the branch circuit shall be protected by one of the following:

(1) A listed combination-type AFCI located at the origin of the branch circuit

(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 conductors is not more than 1.8 m (6 ft) and does not include any additional outlets or devices.

* * *

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.

(B) Common Area Branch Circuits. Branch circuits installed for the purpose of 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 photo cell and occupancy sensor.

(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:

(1) Part of a luminaire or appliance, or

(2) Controlled by a wall switch 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 (5½ 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 2017 *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 in 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 exterior 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) 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 branch circuit as defined 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 shall be installed in accordance with 210.52(C)(1) through (C)(5).

(1) Wall Countertop and Work Surface. A receptacle outlet shall be installed at each wall countertop and work surface that is 300 mm (12 in.) or wider. 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 on a wall directly behind a range, counter-mounted cooking unit, or sink in the installation described in Figure 210.52(C)(1).

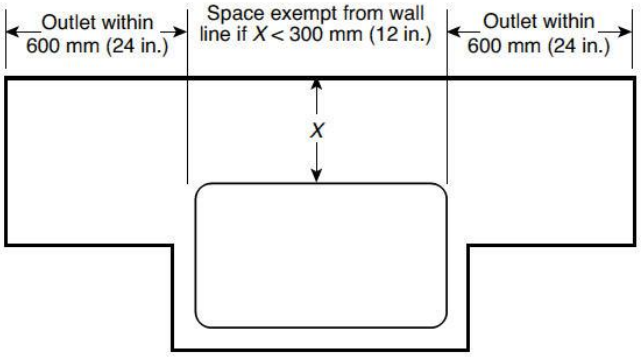
(2) Island Countertop Spaces. At least one receptacle shall be installed at each island countertop space with a long dimension of 600 mm (24 in.) or greater and a short dimension of 300 mm (12 in.) or greater.

(3) Peninsular Countertop Spaces. ((~~At least one receptacle outlet shall be installed at each peninsular countertop long dimension space with a long dimension of 600 mm (24 in.) or greater and a short dimension of 300 mm (12 in.) or greater. A peninsular countertop is measured from the connected perpendicular wall~~.)) A receptacle in a wall countertop space shall be permitted to serve as the receptacle for a peninsular countertop space where the spaces are contiguous and the receptacle is located within 8 feet of the outside edge of the peninsular countertop.

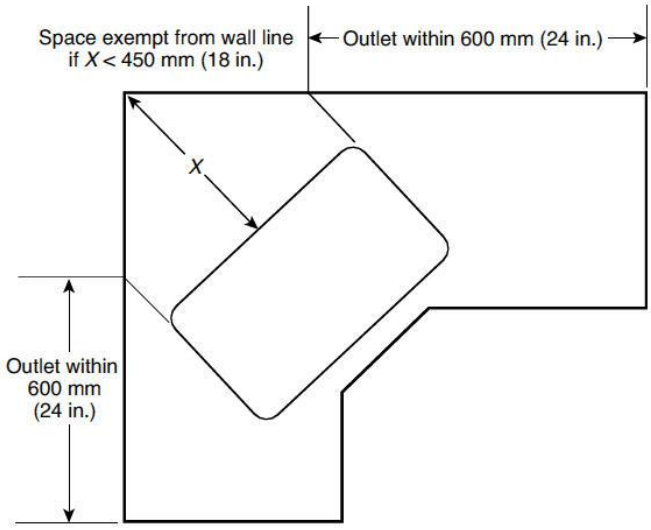
Informational Note: WAC 296-46B-210-052(C) has been incorporated into 210.52(C)(3).

(4) Separate Spaces. Countertop spaces separated by rangetops, refrigerators, or sinks shall be considered as separate countertop spaces in applying the requirements of 210.52(C)(1). If a range, counter-mounted cooking unit, or sink is installed in an island or peninsular countertop and the depth of the countertop behind the range, counter-mounted cooking unit, or sink is less than 300 mm (12 in.), the range, counter-mounted cooking unit, or sink shall be considered to divide the countertop space into two separate countertop spaces. Each separate countertop space shall comply with the applicable requirements in 210.52(C).

(5) Receptacle Outlet Location. Receptacle outlets shall be located on or above, but not more than 500 mm (20 in.) above, the countertop or work surface. Receptacle outlet assemblies listed for use in countertops or work surfaces shall be permitted to be installed in countertops or work surfaces. 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 dedicated space shall not be considered as these required outlets.



Range, counter-mounted cooking unit extending from face of counter



Range, counter-mounted cooking unit mounted in corner

FIGURE 210.52(C)(1) Determination of Area Behind a Range, Counter-Mounted Cooking Unit, or Sink.

Informational Note: See 406.5(E) and 406.5(G) for requirements for installation of receptacles in countertops and 406.5(F) and 406.5(G) for requirements for installation of receptacles in work surfaces.

Exception to (5): To comply with the following conditions (1) and (2), receptacle outlets shall be permitted to be mounted not more than 300 mm (12 in.) below the countertop or work surface. Receptacles mounted below a countertop or work surface in accordance with this exception shall

not be located where the countertop or work surface extends more than 150 mm (6 in.) beyond its support base.

(1) Construction for the physically impaired

(2) On island and peninsular countertops or work surface where the surface is flat across its entire surface (no backsplashes, dividers, etc.) and there are no means to mount a receptacle within 500 mm (20 in.) above the countertop or work surface, such as an overhead cabinet

(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 (6½ 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 (6½ ft) above grade level shall be installed.

(3) Balconies, Decks, and Porches. Balconies, decks, and porches that are attached to the dwelling unit and are accessible from inside 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 (6½ 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, at least one receptacle outlet shall be installed in the areas specified in 210.52(G)(1) through (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 (5½ ft) above the floor.

(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.

* * *

N **210.71 Meeting Rooms.**

(A) General. Each meeting room of not more than 93 m^2 (1,000 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 210.71(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). These

receptacle outlets shall be permitted to be located as determined by the designer or building owner.

(1) Receptacle Outlets in Fixed Walls. Receptacle outlets shall be installed in accordance with 210.52(A)(1) through (A)(4).

(2) Floor Receptacle Outlets. A meeting room that is at least 3.7 m (12 ft) wide and that has a floor area of at least 20 m^2 (215 ft^2) shall have at least one receptacle outlet 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 Section 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.

Section 9. The following sections of Article 215 of the *National Electrical Code*, 2017 Edition, are amended as follows:

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 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.

Section 10. The following sections of Article 220 of the *National Electrical Code*, 2017 Edition, are amended as follows:

ARTICLE 220

Branch-Circuit, Feeder, and Service Load Calculations

* * *

Part II. Branch-Circuit Load Calculations

220.10 General. Branch-circuit loads shall be calculated as shown in 220.12, 220.14, and 220.16.

220.12 Lighting Load for Specified Occupancies. A unit load of not less than that specified in Table 220.12 for occupancies specified shall constitute the minimum lighting load. The floor area for each floor shall be calculated from the outside dimensions of the building, dwelling unit, or other area involved. For dwelling units, the calculated floor area shall not include open porches, garages, or unused or unfinished spaces not adaptable for future use.

Informational Note: The unit values are based on minimum load conditions and 100 percent power factor and may not provide sufficient capacity for the installation contemplated.

~~((Exception No. 1: 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 at the 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.~~

~~(3) The demand factors specified in 220.42 are not applied to the general lighting load.~~

~~Exception No. 2: Where a building is designed and constructed to comply with an energy code adopted by the local authority and specifying an overall lighting density of less than 13.5 volt-amperes/13.5 m^2 (1.2 volt-amperes/1.2 ft^2), the unit lighting loads in Table 220.12 for office and bank areas within the building shall be permitted to be reduced by 11 volt-amperes/11 m^2 (1 volt-amperes/1 ft^2).))~~

Exception: When a building or structure, other than a dwelling unit, is designed and constructed in compliance with the Seattle Energy Code and the demand factors specified in 220.42 are not applied to the general lighting load, the lighting load may be calculated at the values specified in the Seattle Energy Code.

Informational Note: WAC 296-46B-220-012 for lighting load calculations is incorporated with edits herein as an exception.

* * *

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.

* * *

220.53 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.

* * *

220.57 Future Electric Vehicle Demand Load. All permits including the installation or replacement of electrical services shall provide plan details on submitted construction documents showing the location of equipment and conduit for future installation of Electric Vehicle (EV)

charging stations. All occupancies shall provide adequate capacity to serve a future demand load of one electric vehicle charging station per parking space.

Exception: One- and two-family dwellings.

(A) Future Level 2 EV Charging Stations. The total demand load for Level 2 charging stations may be calculated using Table 220.57 if the actual ratings of the future EV charging stations are unknown. The calculation shall utilize the assumption that each charging station is rated at 20 amperes at a nominal voltage of 208/240.

(B) Future Level 3 EV Charging Stations. The total demand load for level 3 charging stations shall be calculated at 100% of the nameplate rating if the actual ratings of the future EV charging stations are unknown. If the actual ratings of the charging stations are known, the actual ratings to calculate the future capacity shall be used.

Exception: If the amperage of the future EV charging stations to be installed is known, then the known amperage shall be used in the demand load calculation that determines the total capacity reserved for the future system.

Informational Note 1: Table 220.57 will provide additional capacity in the service or feeder for future Level 2 EV charging systems when the actual demand loads are unknown. The calculations do not provide 100% capacity in the service or feeders for EV charging. Table 220.57 is not to be used for calculating demand loads when an actual EV charging system is being installed. See Article 220.14(A) and Article 625, Electric Vehicle Charging System, for calculating the installation of an EV charging system. Chapter 3 of the NEC is used to determine the requirements for wiring methods and materials for wiring the installation.

Informational Note 2: See also Article 625, Electric Vehicle Charging System, and charging levels are found in SDCI Tips 132 and 133, Installation of Electric Vehicle (EV) Charger (Residential and Commercial respectively).

Table 220.57 Demand Factors for Level 2 Electric Vehicle Outlets

Number of Parking Spaces	Demand Factor (%)
First 3	100
Next 4—20	75
Next 21—30	50
31 and remainder over	25

* * *

Section 11. The following sections of Article 225 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 225

Outside Branch Circuits and Feeders

* * *

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 guys 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(s)

* * *

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.

Exception No. 2: For buildings or other structures qualifying under the provisions of 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:

(1) Outside location: 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).

(2) Inside location: 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.

Section 12. The following sections of Article 230 of the National Electrical Code, 2017 Edition, are amended as follows:

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, in the 2017 NEC.

(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 for an underground service lateral shall be made at a location acceptable to the serving utility.

Part I. General

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.

* * *

230.5 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

* * *

Part II. Overhead Service Conductors

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 Rating.~~)) 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 Reserved. ((~~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.~~

~~**(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 (24½) 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 830.44(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 power service-drop ((~~or overhead service~~)) conductors shall be ((~~permitted to be~~)) attached to a service mast. Service masts used for the support of service-drop ((~~or overhead service~~)) conductors shall: ((~~be installed in accordance with 230.28(A) and (B).~~

~~(A) Strength.~~ ~~The service mast shall be of adequate strength or be supported by braces or guys 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) Have raceway fittings identified for use with service masts.

(B) Be of rigid steel galvanized conduit having a diameter no smaller than 51 mm (2 in.).

(C) Support only power service-drop conductors.

(D) Be attached to a bracket on the mast or other approved structure located with 610 mm (24 in.) of the mast.

(E) 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,

(F) 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.

(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

* * *

((~~230.33 Spliced Conductors.~~ ~~Service conductors shall be permitted to be spliced or tapped in accordance with 110.14, 300.5(E), 300.13, and 300.15.~~))

230.34 Conversion to Underground Service or Increasing Existing Overhead Services.

Where service for an existing single-family dwelling is converted to an underground service or where existing overhead services are increased, the following requirements shall be met:

(1) Unless a 200-ampere meter enclosure was provided for the existing service, a new 200-ampere approved wide meter enclosure shall be permitted to be installed over an existing meter enclosure that is embedded in a finished exterior wall. Service grounding continuity shall be maintained and the perimeter of such new enclosure shall be sealed watertight with a silicone sealant or approved equivalent.

(2) Conversions to an underground service shall have existing service entrance conductors removed and the top opening of the existing conduit at the weatherhead shall be closed.

(3) Where a new meter enclosure is installed, the interior of the existing meter enclosure shall be removed and service conductors of the same size as those removed shall be installed from the new meter enclosure to the existing service panel. Conductors shall be run through a 51-mm (2-in.) bushing in the back of such new enclosure, through the void area between enclosures, and continue in the existing conduit to the panel.

(4) Any exposed wood or combustible material between the two meter enclosures shall be covered with noncombustible material.

(5) On installations where a meter has been moved outdoors, the existing meter shall be removed. An approved fitting shall be installed on the existing conduit with new conduit of the same size as the existing, to extend from such fitting to a new 200-ampere meter enclosure.

(6) Conductors shall be continuous from the new meter enclosure to the service panel.

(7) On existing services, a weatherhead-to-weatherhead connection shall be permitted. The distance between weatherheads shall not exceed 610 mm (24 in.).

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.

((~~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 defined 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 suitable 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 Rating.

(A) General. Service-entrance conductors shall have an ampacity of not less than the maximum load to be served. Conductors shall be sized to carry 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 310.15. The maximum allowable current of busways shall be that value for which the busway has been listed or labeled.

(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 allowable 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 overcurrent protection 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.

230.43 Wiring Methods for 1,000 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 the provisions of 250.102(A), (B), (C), and (E)~~)) Reserved

(16) ((~~Liquidtight flexible nonmetallic conduit (LFNC)~~)) Reserved

(17) High density polyethylene (HDPE)

(18) Nonmetallic underground conduit with conductors (NUCC)

(19) Reinforced thermosetting resin conduit (RTRC)

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~~)) Reserved

(2) Type MC cable

(3) Type MI cable

(4) ((~~Type IGS cable~~)) Reserved

(5) ((~~Single conductors 1/0 and larger that are listed for use in cable tray~~)) Reserved.

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 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.

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

230.70 General. Means shall be provided to disconnect all 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 installations of cable limiters or other current-limiting devices by special permission of the authority having jurisdiction.

(2) Meters and meter sockets nominally rated not in excess of 1,000 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 1,000 V that have a short-circuit current rating equal to or greater than the available short-circuit 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) Taps used only 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 only with prior approval of the authority having jurisdiction.

(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) 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.

(11) 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.

Part VII. Service Equipment—Overcurrent Protection

230.90 Where Required. Each ungrounded service conductor shall have overload protection. If the service conductors have a lesser ampacity than the overcurrent protection permitted by Sections 230.90 or 310.15 of this *Code* 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), requirements for service conductor size and rating, is incorporated herein with edits.

(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 allowable 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, provided the calculated load does not exceed the ampacity of the service conductors.

Informational Note: See Section 110.21 of this *Code* for identification plate requirements.

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 310.15(B)(7).

(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.

* * *

Part VIII. Services Exceeding 1,000 Volts, Nominal

230.200 General. Service conductors and equipment used on circuits exceeding 1,000 volts, nominal, shall comply with all the applicable provisions of the 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 C2-2012, *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.

* * *

Section 13. The following sections of Article 240 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 240

Overcurrent Protection

* * *

240.24 Location in or on Premises.

(A) Accessibility. ((~~Switches containing fuses and circuit breakers~~)) 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. ((~~unless one of the following applies:~~))

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, dormitories, 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.

* * *

240.87 Arc Energy Reduction. Where the highest continuous current trip setting for which the actual overcurrent device installed in a circuit breaker is rated or can be adjusted is 1,200 A or higher, 240.87(A) and (B) shall apply.

(A) Documentation. Documentation shall be available to those authorized to design, install, operate, or inspect the installation as to the location of the circuit breaker(s).

(B) Method to Reduce Clearing Time. One of the following means shall be provided:

(1) Zone-selective interlocking

(2) Differential relaying

(3) Energy-reducing maintenance switching with local status indicator

(4) Energy-reducing active arc flash mitigation system

(5) An instantaneous trip setting that is less than the available arcing current

(6) An instantaneous override that is less than the available arcing current

(7) An approved equivalent means

Informational Note No. 1: An energy-reducing maintenance switch allows a worker to set a circuit breaker trip unit to "no intentional delay" to reduce the clearing time while the worker is working within an arc-flash boundary as defined in *NFPA 70E*-2015, *Standard for Electrical Safety in the Workplace*, and then to set the trip unit back to a normal setting after the potentially hazardous work is complete.

Informational Note No. 2: An energy-reducing active arc flash mitigation system helps in reducing arcing duration in the electrical distribution system. No change in the circuit breaker or the settings of other devices is required during maintenance when a worker is working within an arc flash boundary as defined in *NFPA 70E*-2015, *Standard for Electrical Safety in the Workplace.*

Informational Note No. 3: An instantaneous trip is a function that causes a circuit breaker to trip with no intentional delay when currents exceed the instantaneous trip setting or current level. If arcing currents are above the instantaneous trip level, the circuit breaker will trip in the minimum possible time.

Informational Note No. 4: IEEE 1584-2002, *IEEE Guide for Performing Arc Flash Hazard Calculations*, is one of the available methods that provide guidance in determining arcing current.

* * *

Section 14. The following sections of Article 250 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 250

Grounding and Bonding

* * *

250.30 Grounding Separately Derived Alternating-Current Systems. In addition to complying with 250.30(A) for grounded systems, or as provided in 250.30(B) for ungrounded systems, separately derived systems shall comply with 250.20, 250.21, 250.22, or 250.26, as applicable. Multiple separately derived systems that are connected in parallel shall be installed in accordance with 250.30.

Informational Note No. 1: An alternate ac power source, such as an on-site generator, is not a separately derived system if the grounded conductor is solidly interconnected to a service supplied system grounded conductor. An example of such a situation is where alternate source transfer equipment does not include a switching action in the grounded conductor and allows it to remain solidly connected to the service-supplied grounded conductor when the alternate source is operational and supplying the load served.

Informational Note No. 2: See 445.13 for the minimum size of conductors that carry fault current.

(A) Grounded Systems. A separately derived ac system that is grounded shall comply with 250.30(A)(1) through (A)(8). Except as otherwise permitted in this article, a grounded conductor shall not be connected to normally non-current-carrying metal parts of equipment, be connected

to equipment grounding conductors, or be reconnected to ground on the load side of the system bonding jumper.

Informational Note: See 250.32 for connections at separate buildings or structures and 250.142 for use of the grounded circuit conductor for grounding equipment.

Exception: Impedance grounded neutral system grounding connections shall be made as specified in 250.36 or 250.187, as applicable.

(1) System Bonding Jumper. An unspliced system bonding jumper shall comply with 250.28(A) through (D). This connection shall be made at any single point on the separately derived system from the source to the first system disconnecting means or overcurrent device, or it shall be made at the source of a separately derived system that has no disconnecting means or overcurrent devices, in accordance with 250.30(A)(1)(a) or (b). The system bonding jumper shall remain within the enclosure where it originates. If the source is located outside the building or structure supplied, a system bonding jumper shall be installed at the grounding electrode connection in compliance with 250.30(C).

Exception No. 1: For systems installed in accordance with 450.6, a single system bonding jumper connection to the tie point of the grounded circuit conductors from each power source shall be permitted.

Exception No. 2: If a building or structure is supplied by a feeder from an outdoor separately derived system, a system bonding jumper at both the source and the first disconnecting means shall be permitted if doing so does not establish a parallel path for the grounded conductor. If a grounded conductor is used in this manner, it shall not be smaller than the size specified for the system bonding jumper but shall not be required to be larger than the ungrounded conductor(s).

For the purposes of this exception, connection through the earth shall not be considered as providing a parallel path.

Exception No. 3: The size of the system bonding jumper for a system that supplies a Class 1, Class 2, or Class 3 circuit, and is derived from a transformer rated not more than 1,000 volt-amperes, shall not be smaller than the derived ungrounded conductors and shall not be smaller than 14 AWG copper or 12 AWG aluminum.

(a) *Installed at the Source.* The system bonding jumper shall connect the grounded conductor to the supply-side bonding jumper and the normally non–current-carrying metal enclosure.

(b) *Installed at the First Disconnecting Means.* The system bonding jumper shall connect the grounded conductor to the supply-side bonding jumper, the disconnecting means enclosure, and the equipment grounding conductor(s).

(2) Supply-Side Bonding Jumper. If the source of a separately derived system and the first disconnecting means are located in separate enclosures, a supply-side bonding jumper shall be installed with the circuit conductors from the source enclosure to the first disconnecting means. A supply-side bonding jumper shall not be required to be larger than the derived ungrounded conductors. The supply-side bonding jumper shall be permitted to be of nonflexible metal raceway type or of the wire or bus type as follows:

(a) A supply-side bonding jumper of the wire type shall comply with 250.102(C), based on the size of the derived ungrounded conductors.

(b) A supply-side bonding jumper of the bus type shall have a cross-sectional area not smaller than a supply-side bonding jumper of the wire type as determined in 250.102(C).

Exception: A supply-side bonding jumper shall not be required between enclosures for installations made in compliance with 250.30(A)(1), Exception No. 2.

(3) Grounded Conductor. If a grounded conductor is installed and the system bonding jumper connection is not located at the source, 250.30(A)(3)(a) through (A)(3)(d) shall apply.

(a) *Sizing for a Single Raceway.* The grounded conductor shall not be smaller than specified in Table 250.102(C)(1).

(b) *Parallel Conductors in Two or More Raceways.* If the ungrounded conductors are installed in parallel in two or more raceways, the grounded conductor shall also be installed in parallel. The size of the grounded conductor in each raceway shall be based on the total circular mil area of the parallel derived ungrounded conductors in the raceway as indicated in 250.30(A)(3)(a), but not smaller than 1/0 AWG.

Informational Note: See 310.10(H) for grounded conductors connected in parallel.

(c) *Delta-Connected System.* The grounded conductor of a 3-phase, 3-wire delta system shall have an ampacity not less than that of the ungrounded conductors.

(d) *Impedance Grounded System.* The grounded conductor of an impedance grounded neutral system shall be installed in accordance with 250.36 or 250.187, as applicable.

(4) Grounding Electrode. The building or structure grounding electrode system shall be used as the grounding electrode for the separately derived system. If located outdoors, the grounding electrode shall be in accordance with 250.30(C).

Exception: If a separately derived system originates in equipment that is listed and identified as suitable for use as service equipment, the grounding electrode used for the service or feeder equipment shall be permitted to be used as the grounding electrode for the separately derived system.

Informational Note No. 1: See 250.104(D) for bonding requirements for interior metal water piping in the area served by separately derived systems.

Informational Note No. 2: See 250.50 and 250.58 for requirements for bonding all electrodes together if located at the same building or structure.

(5) Grounding Electrode Conductor, Single Separately Derived System. A grounding electrode conductor for a single separately derived system shall be sized in accordance with 250.66 for the derived ungrounded conductors. It shall be used to connect the grounded conductor of the derived system to the grounding electrode in accordance with 250.30(A)(4), or as permitted in 250.68(C)(1) and (2). This connection shall be made at the same point on the separately derived system where the system bonding jumper is connected.

Exception No. 1: If the system bonding jumper specified in 250.30(A)(1) is a wire or busbar, it shall be permitted to connect the grounding electrode conductor to the equipment grounding terminal, bar, or bus if the equipment grounding terminal, bar, or bus is of sufficient size for the separately derived system.

Exception No. 2: If the source of a separately derived system is located within equipment listed and identified as suitable for use as service equipment, the grounding electrode conductor from the service or feeder equipment to the grounding electrode shall be permitted as the grounding electrode conductor for the separately derived system, if the grounding electrode conductor is of sufficient size for the separately derived system. If the equipment grounding bus internal to the equipment is not smaller than the required grounding electrode conductor for the separately derived system, the grounding electrode connection for the separately derived system shall be permitted to be made to the bus.

Exception No. 3: A grounding electrode conductor shall not be required for a system that supplies a Class 1, Class 2, or Class 3 circuit and is derived from a transformer rated not more than 1,000 volt-amperes, provided the grounded conductor is bonded to the transformer frame or enclosure by a jumper sized in accordance with 250.30(A)(1), Exception No. 3, and the transformer frame or enclosure is grounded by one of the means specified in 250.134.

(6) Grounding Electrode Conductor, Multiple Separately Derived Systems. A common grounding electrode conductor for multiple separately derived systems shall be permitted. If installed, the common grounding electrode conductor shall be used to connect the grounded conductor of the separately derived systems to the grounding electrode as specified in 250.30(A)(4). A grounding electrode conductor tap shall then be installed from each separately derived system to the common grounding electrode conductor. Each tap conductor shall connect the grounded conductor of the separately derived system to the common grounding electrode conductor. This connection shall be made at the same point on the separately derived system where the system bonding jumper is connected.

Exception No. 1: If the system bonding jumper specified in 250.30(A)(1) is a wire or busbar, it shall be permitted to connect the grounding electrode conductor tap to the equipment grounding terminal, bar, or bus, provided the equipment grounding terminal, bar, or bus is of sufficient size for the separately derived system.

Exception No. 2: A grounding electrode conductor shall not be required for a system that supplies a Class 1, Class 2, or Class 3 circuit and is derived from a transformer rated not more than 1,000 volt-amperes, provided the system grounded conductor is bonded to the transformer frame or enclosure by a jumper sized in accordance with 250.30(A)(1), Exception No. 3, and the transformer frame or enclosure is grounded by one of the means specified in 250.134.

(a) *Common Grounding Electrode Conductor.* The common grounding electrode conductor shall be permitted to be one of the following:

(1) A conductor of the wire type not smaller than 3/0 AWG copper or 250 kcmil aluminum

(2) A metal water pipe that complies with 250.68(C)(1)

(3) The metal structural frame of the building or structure that complies with 250.68(C)(2) or is connected to the grounding electrode system by a conductor not smaller than 3/0 AWG copper or 250 kcmil aluminum

(b) *Tap Conductor Size.* Each tap conductor shall be sized in accordance with 250.66 based on the derived ungrounded conductors of the separately derived system it serves.

Exception: If the source of a separately derived system is located within equipment listed and identified as suitable for use as service equipment, the grounding electrode conductor from the service or feeder equipment to the grounding electrode shall be permitted as the grounding electrode conductor for the separately derived system, if the grounding electrode conductor is of sufficient size for the separately derived system. If the equipment grounding bus internal to the equipment is not smaller than the required grounding electrode conductor for the separately derived system, the grounding electrode connection for the separately derived system shall be permitted to be made to the bus.

(c) *Connections.* All tap connections to the common grounding electrode conductor shall be made at an accessible location by one of the following methods:

(1) A connector listed as grounding and bonding equipment.

(2) Listed connections to aluminum or copper busbars not smaller than 6 mm thick × 50 mm wide (¼ in. thick × 2 in. wide) and of sufficient length to accommodate the

number of terminations necessary for the installation. If aluminum busbars are used, the installation shall also comply with 250.64(A).

(3) The exothermic welding process.

Tap conductors shall be connected to the common grounding electrode conductor in such a manner that the common grounding electrode conductor remains without a splice or joint.

(7) Installation. The installation of all grounding electrode conductors shall comply with 250.64(A), (B), (C), and (E).

(8) Bonding. Structural steel and metal piping shall be connected to the grounded conductor of a separately derived system in accordance with 250.104(D).

(B) Ungrounded Systems. The equipment of an ungrounded separately derived system shall be grounded and bonded as specified in 250.30(B)(1) through (B)(3).

(1) Grounding Electrode Conductor. A grounding electrode conductor, sized in accordance with 250.66 for the largest derived ungrounded conductor(s) or set of derived ungrounded conductors, shall be used to connect the metal enclosures of the derived system to the grounding electrode as specified in 250.30(A)(5) or (6), as applicable. This connection shall be made at any point on the separately derived system from the source to the first system disconnecting means. If the source is located outside the building or structure supplied, a grounding electrode connection shall be made in compliance with 250.30(C).

(2) Grounding Electrode. Except as permitted by 250.34 for portable and vehicle-mounted generators, the grounding electrode shall comply with 250.30(A)(4).

(3) Bonding Path and Conductor. A supply-side bonding jumper shall be installed from the source of a separately derived system to the first disconnecting means in compliance with 250.30(A)(2).

(C) Outdoor Source. If the source of the separately derived system is located outside the building or structure supplied, a grounding electrode connection shall be made at the source location to one or more grounding electrodes in compliance with 250.50. In addition, the installation shall comply with 250.30(A) for grounded systems or with 250.30(B) for ungrounded systems.

Exception: The grounding electrode conductor connection for impedance grounded neutral systems shall comply with 250.36 or 250.187, as applicable.

* * *

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.~~)) *Exception: Only one ground rod is required when one of the following service components is replaced (1) mast; (2) meter; or (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 2.5 m (8 ft) ((~~1.8 m (6 ft)~~)) apart.

Informational Note: The paralleling efficiency of rods is increased by spacing them twice the length of the longest rod.

(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.

(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.

(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: The supplemental electrode shall be permitted to be bonded to the interior metal water piping at any convenient point as specified in 250.68(C)(1), Exception.

(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.

(G) 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 aboveground end and the grounding electrode conductor attachment are protected against physical damage as specified in 250.10.

(H) Plate Electrode. Plate electrodes 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. Bare aluminum or copper-clad aluminum grounding electrode conductors shall not be used where in direct contact with masonry or the earth or where subject to corrosive conditions. Where used outside, aluminum or copper-clad aluminum grounding electrode conductors 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), 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, 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 and enclosures 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 and enclosures 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 and enclosures 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 raceway or cable armor shall be the same size as, or larger than, the 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).

* * *

Part V. Bonding

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.

(2) Connections utilizing threaded couplings or threaded bosses 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.

(A) Metal Water Piping. The metal water piping system shall be bonded as required in (A)(1), (A)(2), or (A)(3) of this section.

(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 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).

(3) Multiple 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

The bonding jumper(s) shall be sized in accordance with Table 250.102(C)(1), based on the size of the feeder or branch circuit conductors that supply the building or structure. The bonding jumper shall not be required to be larger than the largest ungrounded feeder or branch-circuit conductor supplying the building or structure.

(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 Section 7.13 of NFPA 54-2015, *National Fuel Gas Code*.

(C) Structural Metal. Exposed structural metal that is interconnected to form a metal building frame and 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) 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.

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.

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.

* * *

Section 15. The following sections of Article 300 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 300

Wiring Methods

Part I. General Requirements

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 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.

((~~Informational Note: Minor damage to a raceway, cable armor, or cable insulation does not necessarily violate the integrity of either the contained conductors or the conductors' insulation.~~))

(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 (1¼ 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 (2½ 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 (2½ 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 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 (1¼ 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 (1½ 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 (1¼ 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.

(G) Insulated 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 by an identified fitting providing a smoothly rounded insulating surface, unless the conductors are separated from the fitting or raceway by identified insulating material that is securely fastened in place.

Exception: Where threaded hubs or bosses that are an integral part of a cabinet, box, enclosure, or raceway provide 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.

(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 E119-2015, *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.~~)) <u>Reserved.</u>

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.

(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).

(C) Support Methods. One of the following methods of support shall be used:

(1) By 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) By 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, by 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 those mentioned in the preceding tabulation.

(4) By 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. <u>All out-of-service cable shall be removed from accessible ceiling spaces.</u>

Informational Note <u>No. 1</u>: 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.

* * *

Section 16. The following sections of Article 314 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 314

Outlet, Device, Pull, and Junction Boxes; Conduit Bodies; Fittings; and Handhole Enclosures

Part I. Scope and General

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 be attached by using brackets on the outside of the enclosure, or by mounting holes in the back or in a single side of the enclosure, or they shall pass through the interior within 6 mm (¼ 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 1,650 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.

(2) Support Wires. The installation shall comply with the provisions of 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 1,650 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 1,650 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 flexible fittings 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.

* * *

Section 17. The following sections of Article 326 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 326

Integrated Gas Spacer Cable: Type IGS

* * *

Part II. Installation

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

* * *

Part II. Installation

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.

* * *

Section 18. The following sections of Article 334 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 334

Nonmetallic-Sheathed Cable:

Types NM, NMC, and NMS

* * *

Part II. Installation

334.10 Uses Permitted. Type NM, Type NMC, and Type NMS 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) Multifamily dwellings ((~~permitted to be~~)) of Types III, IV, 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, 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.

Informational Note: ((~~No. 1:~~)) Types of building construction and occupancy classifications are defined in ((~~NFPA 220-2015, *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 3-1].~~))

(4) Cable trays in structures permitted to be Types III, IV, or V where the cables are identified for the use.

Informational Note: See 310.15(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

(C) Type NMS. Type NMS cable shall be permitted as follows:

(1) For ((~~both exposed and~~)) concealed work in normally dry locations except as prohibited by 334.10(3)

(2) To be installed or fished in air voids in masonry block or tile walls

* * *

334.15 Exposed Work. In exposed work, except as provided in 300.11(A), cable shall be installed as specified in 334.15(A) through (C).

(A) ((~~To Follow Surface.~~ ~~Cable shall closely follow the surface of the building finish or of running boards.~~)) **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 2½ 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 (¼ 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.

* * *

334.24 Bending Radius. Bends in Types NM, NMC, and NMS cable shall be so made that the cable will not be damaged. The radius of the curve of the inner edge of any bend during or after installation shall not be less than five times the diameter of the cable.

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.

334.30 Securing and Supporting. Nonmetallic-sheathed cable shall be supported and secured by staples; cable ties listed and identified for securement and support; or straps, hangers, or similar fittings designed and installed so as not to damage the cable, at intervals not exceeding 1.4 m (4½ ft) and within 300 mm (12 in.) of every cable entry into enclosures such as outlet boxes, junction boxes, cabinets, or fittings. Flat cables shall not be stapled on edge. Sections of cable protected from physical damage by raceway shall not be required to be secured within the raceway.

* * *

334.40 Boxes and Fittings.

(A) Boxes of Insulating Material. Nonmetallic outlet boxes shall be permitted as provided by 314.3.

(B) ((~~Devices of Insulating Material.~~ ~~Self-contained switches, self-contained receptacles, and nonmetallic-sheathed cable interconnector devices of insulating material that are listed shall be permitted to be used without boxes in exposed cable wiring and for repair wiring in existing buildings where the cable is concealed. Openings in such devices shall form a close fit around the outer covering of the cable, and the device shall fully enclose the part of the cable from~~

~~which any part of the covering has been removed. Where connections to conductors are by binding-screw terminals, there shall be available as many terminals as conductors.~~)) **Reserved.**

(C) ((~~Devices with Integral Enclosures.~~ ~~Wiring devices with integral enclosures identified for such use shall be permitted as provided by 300.15(E).~~)) **Reserved.**

* * *

Section 19. The following sections of Article 338 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 338

Service Entrance Cables: Types SE and USE

* * *

Part II. Installation

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.

(4) Installation Methods for Branch Circuits and Feeders.

(a) *Interior Installations.* 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.

For Type SE cable with ungrounded conductor sizes 10 AWG and smaller, where installed in thermal insulation, the ampacity shall be in accordance with the 60ºC (140ºF) conductor temperature rating. The maximum conductor temperature rating shall be permitted to be used for ampacity adjustment and correction purposes, if the final derated ampacity does not exceed that for a 60ºC (140ºF) rated conductor.

Informational Note No. 1: See 310.15(A)(3) for temperature limitation of conductors.

Informational Note No. 2: For the installation of main power feeder conductors in dwelling units refer to 310.15(B)(7).

(b) *Exterior Installations.* 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. 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 limitation 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

338.24 Bending Radius. Bends in Types USE and SE cable shall be so made that the cable will not be damaged. The radius of the curve of the inner edge of any bend, during or after installation, shall not be less than five times the diameter of the cable.

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.

* * *

Section 20. The following sections of Article 358 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 358

Electrical Metallic Tubing: Type EMT

* * *

Part II. Installation

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.

N **(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.

N **(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.

((*~~N~~* (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.

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.

* * *

Section 21. The following sections of Article 334 of the National Electrical Code, 2017 Edition, are amended as follows:

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.

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), 406.3(D)(2)(b), or 406.3(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 310.15(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 406.3. Power and communications outlets installed together in common housing shall be permitted in accordance with 800.133(A)(1)(d), 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.~~

~~**Part III.Construction Specifications (Concealable Nonmetallic Extensions Only)**~~

~~**382.100 Construction.** Concealable nonmetallic extensions shall be a multilayer flat conductor design consisting of a center ungrounded conductor enclosed by a sectioned grounded conductor, and an overall sectioned 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 per 382.104(B) and (C) and identified in accordance with 310.110(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 grounding conductor and identified in accordance with 200.6.~~

~~**(C) Grounding Conductor (Outer Sectioned Layers).** The 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 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 Ground" printed at regular intervals throughout the cable~~

~~**382.112 Insulation.** The ungrounded and grounded flat conductor layers shall be individually insulated and comply with 310.10. The 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 310.11(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.~~))

Section 22. The following sections of Article 394 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 394

Concealed Knob-and-Tube Wiring

Part I. General

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~~))

* * *

394.23 In Accessible Attics. Conductors in unfinished attics and roof spaces shall comply with 394.23(A) or (B).

Informational Note: See 310.15(A)(3) for temperature limitation of conductors.

(A) Accessible by Stairway or Permanent Ladder. Conductors 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 where conductors are 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, 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.

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.

* * *

Section 23. The following sections of Article 398 of the National Electrical Code, 2017 Edition, are amended as follows:

* * *

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.~~

~~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 (4½ 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 (½ 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 (4½ 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 (4½ ft) to maintain at least 65 mm (2½ 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.~~))

Section 24. The following sections of Article 404 of the National Electrical Code, 2017 Edition, are amended as follows:

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 Snap Switches.

(A) ((~~Surface-Type.~~ ~~Snap switches used with open wiring on insulators shall be mounted on insulating material that separates the conductors at least 13 mm (½ in.) from the surface wired over.~~)) **Reserved.**

(B) Box Mounted. Flush-type snap 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 snap switches 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 switch is seated against the box. Screws used for the purpose of attaching a snap switch to a box shall be of the type provided with a listed snap switch, 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 1,200 amperes at 250 volts or less, and at over 1,000 amperes at 251 to 1,000 volts, shall be used only as isolating switches and shall not be opened under load.

(B) To Interrupt Currents. To interrupt currents over 1,200 amperes at 250 volts, nominal, or less, or over 600 amperes at 251 to 1,000 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 of the interlocking type to prevent the door from being opened when the circuit is energized. 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, "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.

* * *

Section 25. The following sections of Article 406 of the National Electrical Code, 2017 Edition, are amended as follows:

Article 406

Receptacles, Cord Connectors, and

Attachment Plugs (Caps)

* * *

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 (((~~7~~))) (8) shall be listed tamper-resistant receptacles.

(1) Dwelling units in all areas specified in 210.52 and 550.13

(2) Guest rooms and guest suites of hotels and motels

(3) Child care facilities

(4) Preschools and elementary 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 waiting transportation, gymnasiums, skating rinks, and auditoriums

(7) Dormitories

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.*

Exception to (1), (2), (3), (4), (5), (6), and (7): Receptacles in the following locations shall not be required to be tamper resistant:

(1) Receptacles located more than 1.7 m (5½ 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)

(8) Psychiatric patient care facilities where accessible to psychiatric patients and children five years of age and under.

Informational Note No. 2: WAC 296-46B-406R, requirements for tamper-resistant receptacles in psychiatric care facilities, is incorporated herein with edits.

* * *

Section 26. The following sections of Article 410 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 410

Luminaires, Lampholders, and Lamps

* * *

Part II. Luminaire Locations

410.10 Luminaires in Specific Locations.

(A) Wet and Damp Locations. Luminaires installed in wet or damp location 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 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 to not 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. 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. 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 for damp locations, or marked for wet locations where subject to shower spray. 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 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 (1½ in.) measured from the lowest surface of the roof decking to the top of the luminaire.

* * *

Section 27. The following sections of Article 424 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 424

Fixed Electric Space-Heating Equipment

* * *

Part III. Control and Protection of Fixed Electric Space-Heating Equipment

424.19 Disconnecting Means. Means shall be provided to simultaneously disconnect the heater, motor controller(s), and supplementary overcurrent protective device(s) of all fixed electric space-heating equipment from all ungrounded conductors. Where heating equipment is supplied by more than one source, feeder, or branch circuit, the disconnecting means shall be grouped and identified as having multiple disconnecting means. Each disconnecting means shall simultaneously disconnect all ungrounded conductors that it controls. The disconnecting means specified in 424.19(A) and (B) shall have an ampere rating not less than 125 percent of the total load of the motors and the heaters and shall be lockable in accordance with 110.25.

(A) Heating Equipment with Supplementary Overcurrent Protection. The disconnection means for fixed electric space-heating equipment with supplementary overcurrent protection shall be within sight from the supplementary overcurrent protective device(s), on the supply side of these devices, if fuses, and in addition, shall comply with either 424.19(A)(1) or (A)(2).

(1) Heater Containing No Motor Rated over 1/8 Horsepower. The disconnecting means specified in 424.19 or unit switches complying with 242.19(C) shall be permitted to serve as the required disconnecting means for both the motor controller(s) and the heater under either of the following conditions:

(1) The disconnecting means provided is also within sight from the motor controller(s) and the heater.

(2) The disconnection means is lockable in accordance with 110.25.

(2) Heater Containing a Motor(s) Rated over 1/8 Horsepower. The above disconnecting means shall be permitted to serve as the required disconnecting means for both the motor controller(s) and heater under either of the following conditions:

(1) Where the disconnecting means is in sight from the motor controller(s) and the heater and complies with Part IX of Article 430.

(2) Where a motor(s) of more than 1/8 hp and the heater are provided with a single unit switch that complies with 422.34(A), (B), (C), or (D), the disconnecting means shall be permitted to be out of sight from the motor controller.

(B) Heating Equipment Without Supplementary Overcurrent Protection.

(1) Without Motor or with Motor Not over 1/8 Horsepower. For fixed electric space-heating equipment without a motor rated over 1/8 hp, the branch-circuit switch or circuit breaker shall be permitted to serve as the disconnecting means where the switch or circuit breaker is within sight from the heater or is lockable in accordance with 110.25.

(2) Over 1/8 Horsepower. For motor-driven electric space-heating equipment with a motor rated over 1/8 hp a disconnecting means shall be located within sight from the motor controller or shall be permitted to comply with the requirements in 424.19(A)(2).

(C) Unit Switch(es) as Disconnecting Means. A unit switch(es) with a marked "off" position that is part of a fixed heater and disconnects all ungrounded conductors shall be permitted as the disconnecting means required by this article where other means for disconnection are provided in the types of occupancies in 424.19(C)(1) through (C)(4).

(1) Multifamily Dwellings. In multifamily dwellings, the other disconnecting means shall be within the dwelling unit, or on the same floor as the dwelling unit in which the fixed heater is installed, and shall also be permitted to control lamps and appliances.

(2) Two-Family Dwellings. In two-family dwellings, the other disconnecting means shall be permitted to be either inside or outside of the dwelling unit in which the fixed heater is installed. In this case, an individual switch or circuit breaker for the dwelling unit shall be permitted and shall also be permitted to control lamps and appliances.

(3) One-Family Dwellings. In one-family dwellings, the service disconnecting means shall be permitted to be the other disconnecting means.

(4) Other Occupancies. In other occupancies, the branch-circuit switch or circuit breaker, where readily accessible for servicing of the fixed heater, shall be permitted as the other disconnecting means.

* * *

Section 28. The following sections of Article 440 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 440

Air-Conditioning and Refrigerating Equipment

* * *

Part II. Disconnecting Means

* * *

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 one- and two-family 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, disconnects the indoor unit, and an indoor disconnecting means is not required by the manufacturer.

Informational Note No. 1: WAC 296-46B-440(014), Disconnecting means, is incorporated herein.

Informational Note No. ((1)) 2: See Parts VII and IX of Article 430 for additional requirements.

Informational Note No. ((2)) 3: See 110.26.

* * *

Section 29. The following sections of Article 450 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 450

Transformers and Transformer Vaults (Including Secondary Ties)

* * *

Part I. General Provisions

* * *

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 ANSI/IEEE C57.12.00-1993, *General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers*, and ANSI/IEEE C57.12.01-1989, *General Requirements for Dry-Type Distribution and Power Transformers*.

Informational Note No. 2: Additional losses may occur in some transformers where nonsinusoidal currents are present, resulting in increased heat in the transformer above its rating. See ANSI/IEEE C57.110-1993, *Recommended Practice for Establishing 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.

* * *

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 112½ 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 (¼-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 C2-2007, *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;

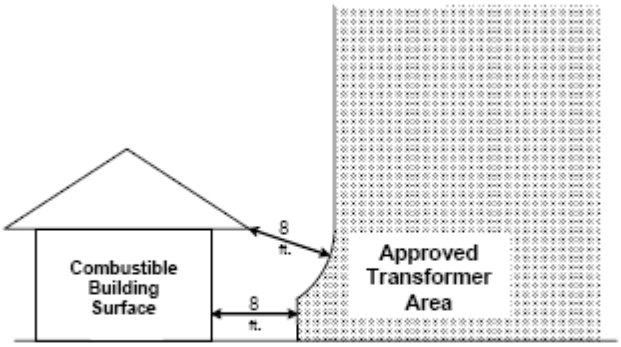


Figure 450-1

(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.

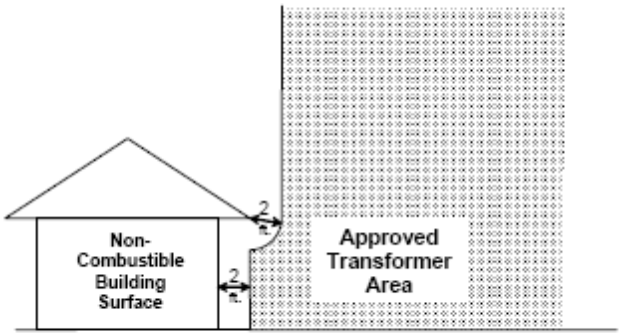


Figure 450-2

(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 acceptable.

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 ANSI/ASTM E119-15, *Method 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 80-2013, *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, access being allowed only to qualified persons. Personnel doors shall open in the direction of egress and be equipped with listed panic 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 1½ hours.~~

~~Informational Note: See ANSI/UL 555-2011, *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.~~))

Section 30. The following sections of Article 500 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 500

Hazardous (Classified) Locations,

Classes I, II, and III, Divisions 1 and 2

* * *

500.5 Classifications of Locations.

(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 No. 1: 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 No. 2: For further information regarding classification and ventilation of areas involving closed-circuit ammonia refrigeration systems, see ANSI/ASHRAE 15-2013, *Safety Standard for Refrigeration Systems*, and 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 solvents

(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, ignitable 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 ignitable 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.

(2) Class I, Division 2. A Class I, Division 2 location is a location:

(1) In which volatile flammable gases, flammable liquid–produced vapors, or combustible liquid–produced vapors are handled, processed, or used, but in which the liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems or in case of abnormal operation of equipment, or

(2) In which ignitible concentrations of flammable gases, flammable liquid–produced vapors, or combustible liquid–produced vapors are normally prevented by positive mechanical ventilation and which might become hazardous through failure or abnormal operation of the ventilating equipment, or

(3) That is adjacent to a Class I, Division 1 location, and to which ignitible concentrations of flammable gases, flammable liquid–produced vapors, or combustible liquid–produced vapors above their flash points might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clean air and effective safeguards against ventilation failure are provided.

Informational Note No. 1: This classification usually includes locations where volatile flammable liquids or flammable gases or vapors are used but that, in the judgment of the authority having jurisdiction, would become hazardous only in case of an accident or of some unusual operating condition. The quantity of flammable material that might escape in case of accident, the adequacy of ventilating equipment, the total area involved, and the record of the industry or business with respect to explosions or fires are all factors that merit consideration in determining the classification and extent of each location.

Informational Note No. 2: Piping without valves, checks, meters, and similar devices would not ordinarily introduce a hazardous condition even though used for flammable liquids or gases. Depending on factors such as the quantity and size of the containers and ventilation, locations used for the storage of flammable liquids or liquefied or compressed gases in sealed containers may be considered either hazardous (classified) or unclassified locations. See NFPA 30-2015, *Flammable and Combustible Liquids Code*, and NFPA 58-2014, *Liquefied Petroleum Gas Code*.

(C) Class II Locations. Class II locations are those that are hazardous because of the presence of combustible dust. Class II locations shall include those specified in 500.5(C)(1) and (C)(2).

(1) Class II, Division 1. A Class II, Division 1 location is a location:

(1) In which combustible dust is in the air under normal operating conditions in quantities sufficient to produce explosive or ignitible mixtures, or

(2) Where mechanical failure or abnormal operation of machinery or equipment might cause such explosive or ignitible mixtures to be produced, and might also provide a source of ignition through simultaneous failure of electrical equipment, through operation of protection devices, or from other causes, or

(3) In which Group E combustible dusts may be present in quantities sufficient to be hazardous.

Informational Note: Dusts containing magnesium or aluminum are particularly hazardous, and the use of extreme precaution is necessary to avoid ignition and explosion.

(2) Class II, Division 2. A Class II, Division 2 location is a location:

(1) In which combustible dust due to abnormal operations may be present in the air in quantities sufficient to produce explosive or ignitible mixtures; or

(2) Where combustible dust accumulations are present but are normally insufficient to interfere with the normal operation of electrical equipment or other apparatus, but could as a result of infrequent malfunctioning of handling or processing equipment become suspended in the air; or

(3) In which combustible dust accumulations on, in, or in the vicinity of the electrical equipment could be sufficient to interfere with the safe dissipation of heat from electrical equipment, or could be ignitible by abnormal operation or failure of electrical equipment.

Informational Note No. 1: The quantity of combustible dust that may be present and the adequacy of dust removal systems are factors that merit consideration in determining the classification and may result in an unclassified area.

Informational Note No. 2: Where products such as seed are handled in a manner that produces low quantities of dust, the amount of dust deposited may not warrant classification.

(D) Class III Locations. Class III locations are those that are hazardous because of the presence of easily ignitible fibers or where materials producing combustible flyings are handled, manufactured, or used, but in which such fibers/flyings are not likely to be in suspension in the

air in quantities sufficient to produce ignitible mixtures. Class III locations shall include those specified in 500.5(D)(1) and (D)(2).

(1) Class III, Division 1. A Class III, Division 1 location is a location in which easily ignitible fibers/flyings are handled, manufactured, or used.

Informational Note No. 1: Such locations usually include some parts of rayon, cotton, and other textile mills; combustible fibers/flyings manufacturing and processing plants; cotton gins and cotton-seed mills; flax-processing plants; clothing manufacturing plants; woodworking plants; and establishments and industries involving similar hazardous processes or conditions.

Informational Note No. 2: Easily ignitible fibers/flyings include rayon, cotton (including cotton linters and cotton waste), sisal or henequen, istle, jute, hemp, tow, cocoa fiber, oakum, baled waste kapok, Spanish moss, excelsior, and other materials of similar nature.

(2) Class III, Division 2. A Class III, Division 2 location is a location in which easily ignitible fibers/flyings are stored or handled other than in the process of manufacture.

* * *

Section 31. The following sections of Article 517 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 517

Healthcare Facilities

* * *

517.31 Requirements for the Essential Electrical System.

(A) Separate Branches. Essential electrical systems for hospitals 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:**6.4.2.2.1.2]

(B) Transfer Switches. 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.

One transfer switch and downstream distribution system shall be permitted to serve one or more branches in a facility with a maximum demand on the essential electrical system of 150 kVA.

Informational Note No. 1: See NFPA 99-2015, *Health Care Facilities Code,* 6.4.3.2, Transfer Switches; 6.4.2.1.5, Automatic Transfer Switch Features; 6.4.2.1.5.15, Nonautomatic Transfer Switch Features; and 6.4.2.1.7, 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:

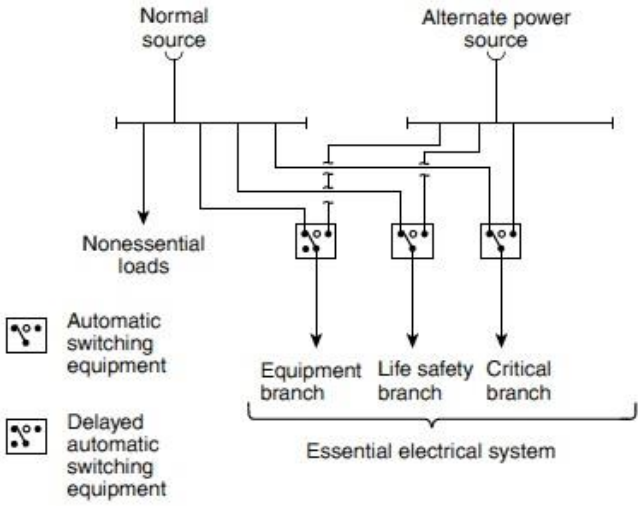
(1) These loads shall not be transferred if the transfer will overload the generating equipment.

(2) These loads shall be automatically shed upon generating equipment overloading.

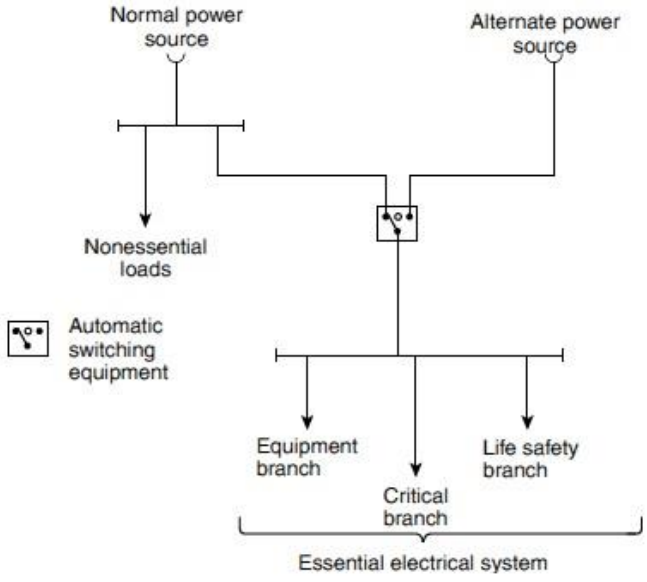
(2) Contiguous Facilities. Hospital power sources and alternate power sources shall be permitted to serve the essential electrical systems of contiguous or same site facilities.

(C) Wiring Requirements.

(1) Separation from Other Circuits. The life safety branch and critical branch of the essential electrical system shall be kept entirely independent of all other wiring and equipment and shall not enter the same raceways, boxes, or cabinets with each other or other wiring.



Informational Note Figure 517.31(a) Hospital—Minimum Requirement (greater than 150 kVA) for Transfer Switch Arrangement.



Informational Note Figure 517.31(b) Hospital—Minimum Requirement (150 kVA or less) for Transfer Switch Arrangement.

Where 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 general care circuits from the two separate systems shall be kept independent of each other.

Where 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.

Wiring of the life safety branch and the critical branch shall be permitted to occupy the same raceways, boxes, or cabinets of other circuits not part of the 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

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.

(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. Where installed as branch circuits in patient care spaces, the installation shall comply with the requirements of 517.13(A) and (B). 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 rigid ceiling structures where there is no access above the ceiling space after the luminaire is installed

(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 generator set(s) shall have the capacity and rating to meet the demand produced by the load at any given time.

Demand calculations for sizing of the generator set(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 hospital generator set(s).

(E) Receptacle Identification. The cover plates for the electrical receptacles or the electrical receptacles themselves supplied from the essential electrical system shall have a distinctive color or marking so as to be readily identifiable. [**99:**6.4.2.2.6.2(C)]

(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 system to the point at which the life safety, critical, and equipment branches are separated. Installation of the transfer 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: The terms *coordination* and *coordinated* as used in this section do not cover the full range of overcurrent conditions.

* * *

Section 32. The following sections of Article 553 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 553

Floating Buildings

* * *

Part II. Services and Feeders

553.4 Location of Service Equipment. The service equipment for a floating building shall be located adjacent to, but not in or on, the building or any floating structure. The main overcurrent protective device that feeds the floating structure 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.

Exception: In existing installations, the service may be located in or on the building only by special permission from the authority having jurisdiction.

Informational Note: WAC 296-46B-553(004), Special occupancies—Floating buildings and similar facilities, is incorporated herein with edits.

* * *

Section 33. The following sections of Article 555 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 555

Marinas, Boatyards, and Commercial and Noncommercial Docking Facilities

* * *

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.

Section 34. The following sections of Article 600 of the National Electrical Code, 2017 Edition, are amended as follows:

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.

* * *

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 (½ 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.~~ ~~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.~~))

* * *

Section 35. The following sections of Article 620 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 620

Elevators, Dumbwaiters, Escalators, Moving Walks, Platform Lifts, and Stairway Chairlifts

Part I. General

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 A17.1-2013/CSA B44-13, *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~~) 2011, *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.

((~~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.

Control Room (for Elevator, Dumbwaiter). An enclosed control space outside the hoistway, intended for full bodily entry, that contains the elevator motor controller. The room could also contain electrical and/or mechanical equipment used directly in connection with the elevator or dumbwaiter but not the electric driving machine or the hydraulic machine.

Control Space (for Elevator, Dumbwaiter). A space inside or outside the hoistway, intended to be accessed with or without full bodily entry, that contains the elevator motor controller. This space could also contain electrical and/or mechanical equipment used directly in connection with the elevator or dumbwaiter but not the electrical driving machine or the hydraulic machine.

Control System. The overall system governing the starting, stopping, direction of motion, acceleration, speed, and retardation of the moving member.

Controller, Motion. The electrical device(s) for that part of the control system that governs the acceleration, speed, retardation, and stopping of the moving member.

Controller, Motor. The operative units of the control system comprised of the starter device(s) and power conversion equipment used to drive an electric motor, or the pumping unit used to power hydraulic control equipment.

Controller, Operation. The electrical device(s) for that part of the control system that initiates the starting, stopping, and direction of motion in response to a signal from an operating device.

Machine Room (for Elevator, Dumbwaiter). An enclosed machinery space outside the hoistway, intended for full bodily entry, that contains the electrical driving machine or the hydraulic machine. The room could also contain electrical and/or mechanical equipment used directly in connection with the elevator or dumbwaiter

Machinery Space (for Elevator, Dumbwaiter). A space inside or outside the hoistway, intended to be accessed with or without full bodily entry, that contains elevator or dumbwaiter mechanical equipment, and could also contain electrical equipment used directly in connection with the elevator or dumbwaiter. This space could also contain the electrical driving machine or the hydraulic machine.

Operating Device. The car switch, pushbuttons, key or toggle switch(s), or other devices used to activate the operation controller.

Remote Machine Room and Control Room (for Elevator, Dumbwaiter). A machine room or control room that is not attached to the outside perimeter or surface of the walls, ceiling, or floor of the hoistway.

Remote Machinery Space and Control Space (for Elevator, Dumbwaiter). A machinery space or control space that is not within the hoistway, machine room, or control room and that is not attached to the outside perimeter or surface of the walls, ceiling, or floor of the hoistway.

Signal Equipment. Includes audible and visual equipment such as chimes, gongs, lights, and displays that convey information to the user.

* * *

620.5 Working Clearances. Working space shall be provided about controllers, disconnecting means, and other electrical equipment in accordance with ((~~110.26(A)~~)) the *Seattle Building Code*, Chapter 30.

((~~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.~~))

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.

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*.

* * *

Part III. Wiring

620.21 Wiring Methods. Conductors and optical fibers located in hoistways, in escalator and moving walk wellways, in platform lifts, stairway chairlift runways, machinery spaces, control spaces, in or on cars, in 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).

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.~~))

(**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 and shall be of a flame-retardant type and shall be part of the following~~:)) Reserved

((~~a. Listed equipment~~

~~b. A driving machine, or~~

~~c. A driving machine brake~~

~~*Exception 620.21(A)(1)(c)(1), (2), and (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) 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)~~)) 915 mm (3 ft) in length, 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 the following:

a. Listed equipment

b. A driving machine, or

c. A driving machine brake

(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) 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 the following:

(1) Listed equipment

(2) A driving machine, or

(3) A driving machine brake

(4) Counterweight. The following wiring methods shall be permitted on the counterweight assembly in lengths not to exceed ((~~1.8 m (6 ft)~~)) 915 mm (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, shall be of a flame-retardant type, and shall be part of the following:

a. Listed equipment

b. A driving machine, or

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.

Exception: 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.

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.

* * *

Part VI. Disconnecting Means and Control

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 circuit required in 620.22, 620.23, and 620.24.

(A) Type. 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. The disconnecting means shall be a listed device.

Informational Note: For additional information, see ASME A17.1-2013/CSA B44-13, *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 <u>located within a dwelling unit</u>, 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.

(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.

N **(2) Available Short-Circuit Current Field Marking.** Where an elevator control panel is used, it shall be legibly marked in the field with the maximum available short-circuit current at its line terminals. The field marking(s) shall include the date the short-circuit current calculation was performed and be of sufficient durability to withstand the environment involved.

When modifications to the electrical installation occur that affect the maximum available short-circuit current at the elevator control panel, the maximum available short-circuit current shall be verified or recalculated as necessary to ensure the elevator control panel's short-circuit current rating is sufficient for the maximum available short-circuit current at the line terminals of the equipment. The required field marking(s) shall be adjusted to reflect the new level of maximum available short-circuit current.

N **(E) Surge Protection.** Where any of the disconnecting means in 620.51 has been designated as supplying an emergency system load, 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.

* * *

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, the disconnecting means shall be located in a machinery space or control space outside the hoistway that is readily accessible to only qualified persons.~~))

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.

* * *

Part VII. Overcurrent Protection

* * *

620.62 Selective Coordination. Where more than one driving machine disconnecting means is supplied by a single feeder, 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 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.

* * *

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.

* * *

Part X. Emergency and Standby Power Systems

620.91 Emergency and Standby Power Systems. ((~~An elevator(s) 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 A17.1-2013/CSA B44-13, *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.

(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 load conditions, a means shall 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.

Section 36. The following sections of Article 625 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 625

Electric Vehicle Charging System

* * *

625.27 Requirements for Future Installation of Charging Outlets. To facilitate future installation of Electric Vehicle (EV) charging outlets in all occupancies when a new or replacement electrical service is to be installed, the following shall be provided:

(1) A location shall be designated, together with the required working clearances, for a future electric vehicle charging system panelboard. The location shall be marked with a permanent placard identifying the space as "RESERVED FOR FUTURE ELECTRICAL VEHICLE CHARGING SYSTEM." The clearance dimensions shall be documented on the placard. The placard shall be written with 1-inch letters, or

(2) Space and capacity as calculated by Section 220.57 shall be reserved in the electrical service equipment for installation of an overcurrent protection device to serve the electric vehicle

charging system branch circuits. Space shall be reserved for future EV charging equipment. The location shall be marked with a permanent placard identifying the space as "RESERVED FOR FUTURE ELECTRIC VEHICLE CHARGING SERVICE." The clearance dimensions shall be documented on the placard. The placard shall be written with 1-inch letters.

(3) Conduit pathway shall be identified on the electrical drawings. Where the construction of the building will prevent the future installation of conduit, at least one of the following means shall be installed to facilitate the installation of a future Electrical Vehicle Charging System:

(a) Block outs in the structure,

(b) Short sections of conduit stubbed out to accessible space, or

(c) Other acceptable means.

Informational Note: Article 625.27 applies to all sites that provide parking for automobiles. See also 220.57, Calculating Future Electrical Vehicle Demand Load, for calculating future uninstalled demand loads.

* * *

Section 37. The following sections of Article 645 of the National Electrical Code, 2017 Edition, are amended as follows:

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 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: 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.

Section 38. The following sections of Article 680 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 680

Swimming Pools, Fountains, and Similar Installations

Part VII. Hydromassage Bathtubs

* * *

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.

* * *

Section 39. The following sections of Article 690 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 690

Solar Photovoltaic (PV) Systems

Part I. General

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. *[See Figure 690.1(a) and Figure 690.1(b).]* The systems covered by this article may be interactive with other electrical power production sources or stand-alone or both, and may or may not be connected to energy storage systems such as batteries. These PV systems may have ac or dc output for utilization.

Informational Note No. 1: ((~~Article 691 covers the installation of largescale PV electric supply stations.~~)) 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.

* * *

Section 40. The following sections of Article 695 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 695

Fire Pumps

* * *

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 20-2013, 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).

(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 (B)(1) and (B)(2): An alternate source of power shall not be required where a back-up engine-driven or back-up steam turbine driven fire pump is installed. [**20:**9.3.3]*

(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 (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).

(3) Selective Coordination. The overcurrent protective device(s) in each disconnecting means shall be selectively coordinated with any other supply-side overcurrent protective device(s). 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: 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.

(D) On-Site Standby Generator as Alternate Source. An onsite standby generator(s) used as an alternate source of power shall comply with (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 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]

* * *

Section 41. The following sections of Article 700 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 700

Emergency Systems

Part I. General

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 99-2015, *Health Care Facilities Code.*

Informational Note No. 3: For specification of locations where emergency lighting is considered essential to life safety, see NFPA *101*-2015, *Life Safety Code.*

Informational Note No. 4: For further information regarding performance of emergency and standby power systems, see NFPA 110-2013, *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 acceptable to 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. Where battery systems or unit equipments are involved, including batteries used for starting, control, or ignition in auxiliary engines, the authority having jurisdiction shall require periodic maintenance by the building owner or manager.

(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 110-2013, *Standard for Emergency and Standby Power Systems.*

N **(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.

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 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 suppression 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).

* * *

Part II. Circuit Wiring

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 of two or more emergency circuits supplied from the same source shall be permitted in the same raceway, cable, box, or cabinet. 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 (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., c., and 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 non-emergency 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)(5)(b)(1) and Informational Note Figure 700.10(B)(5)(b)(2).

c. Emergency circuits shall not originate from the same vertical switchgear section, vertical switchboard section, panelboard enclosure, or individual disconnect enclosure as other circuits.

d. It shall be permissible to utilize single or multiple feeders to supply distribution equipment between an emergency source and the point where the emergency loads are separated from all other loads.

(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.

(D) Fire Protection. Emergency systems shall meet the additional requirements in (D)(1) through (D)(3) in the following occupancies:

(1) Assembly occupancies for not less than 1,000 persons

(2) Buildings above 23 m (75 ft) in height

(3) Health care occupancies where persons are not capable of self-preservation

(4) Educational occupancies with more than 300 occupants

(1) 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 suppression 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.

Informational Note No. 1: Fire-resistive cables are tested to ANSI/UL 2196, *Tests for Fire Resistive 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.

(2) Feeder-Circuit Equipment. Equipment for feeder circuits (including transfer switches, transformers, and panelboards) shall be located either in spaces fully protected by approved automatic fire suppression systems (including sprinklers, carbon dioxide systems) or in spaces with a 2-hour fire resistance rating.

(3) 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)(1). The integrity of the generator control wiring shall be continuously monitored. Loss of integrity of the remote start circuit(s) shall initiate visual and audible annunciation of generator malfunction at the generator local and remote annunciator(s) and start the generator(s).

* * *

Part III. Sources of Power

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(A) through (E). Unit equipment in accordance with 700.12(F) shall satisfy the applicable requirements of this article.

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.

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(A) through (E) shall be installed either in spaces fully protected by approved automatic fire suppression systems (sprinklers, carbon dioxide systems, and so forth) or in spaces with a 1-hour fire rating where located within the following:

(1) Assembly occupancies for more than 1,000 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) Health care occupancies where persons are not capable of self-preservation

(4) Educational occupancies with more than 300 occupants

Informational Note No. 1: For the definition of *Occupancy Classification,* see ((~~Section 6.1 of NFPA 101-2015, *Life Safety Code*~~)) Chapter 3 of the *Seattle Building Code*.

Informational Note No. 2: For information, see ANSI/IEEE 493-2007, *Recommended Practice for the Design of Reliable Industrial and Commercial Power Systems*.

(A) Storage Battery. Storage batteries shall be of suitable rating and capacity to supply and maintain the total load for a minimum period of 1½ hours, without the voltage applied to the load falling below 87½ percent of normal. Automotive-type batteries shall not be used.

An automatic battery charging means shall be provided.

(B) Generator Set.

(1) Prime Mover-Driven. For a generator set driven by a prime mover acceptable to 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 permitting a 15-minute setting shall be provided to avoid retransfer in case of short-time reestablishment of the normal source.

(2) Internal Combustion Engines as Prime Movers. 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' 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, this pump shall be connected to the emergency power system.

(3) Dual Supplies. 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. Means shall be

provided for automatically transferring from one fuel supply to another where dual fuel supplies are used.

((~~Exception: Where acceptable to 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 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.

(5) 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.

(6) 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.

(C) Uninterruptible Power Supplies. Uninterruptible power supplies used to provide power for emergency systems shall comply with the applicable provisions of 700.12(A) and (B) and shall be listed for emergency use.

Informational Note: UL 924 *Emergency Lighting and Power Equipment* is the appropriate standard for emergency equipment.

(D) 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.

(E) 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.

(F) 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

(2) Installation of Unit Equipment. Unit equipment shall be installed in accordance with 700.12(F)(2)(1) through (6).

(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 (a) or (b):

(a) For a period of at least 1½ hours without the voltage falling below 87½ 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 1½ 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 the same branch circuit as that serving the normal lighting in the area and connected ahead of any local switches.

Exception: In a separate and uninterrupted area supplied by a minimum of three normal lighting circuits that are not part of a multiwire branch circuit, 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.

(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.

* * *

700.16 Emergency Illumination. Emergency illumination shall include means of egress lighting, illuminated exit signs, and all other luminaires specified as necessary to provide required illumination.

Emergency lighting systems shall be designed and installed so that the failure of any individual lighting element, such as the burning out of a lamp, cannot leave in total darkness any space that requires emergency illumination.

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.

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.

Section 42. The following sections of Article 701 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 701

Legally Required Standby Systems

Part I. General

* * *

701.4 Capacity and Rating. A legally required standby system shall have adequate capacity and rating for the supply of all equipment intended to be operated at one time. Legally required standby system equipment shall be suitable for the maximum available fault current at its terminals.

The legally required standby alternate power source shall be permitted to supply both legally required standby and optional standby system loads under either of the following conditions:

(1) Where the alternate source has adequate capacity to handle all connected loads

(2) Where automatic selective load pickup and load shedding is 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 110-2013, *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 groundfault 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 110-2013, *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

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 (F). Unit equipment in accordance with 701.12(G) shall satisfy the applicable requirements of this article.

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.

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*.

(A) Storage Battery. Storage batteries shall be of suitable rating and capacity to supply and maintain the total load for a minimum period of 1½ hours without the voltage applied to the load falling below 87½ percent of normal. Automotive-type batteries shall not be used.

An automatic battery charging means shall be provided.

(B) Generator Set.

(1) Prime Mover-Driven. For a generator set driven by a prime mover acceptable to 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) Dual Supplies. 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 acceptable to 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.

(C) Uninterruptible Power Supplies. Uninterruptible power supplies used to provide power for legally required standby systems shall comply with the applicable provisions of 701.12(A) and (B).

(D) 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 the applicable provisions of 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.

(E) Connection Ahead of Service Disconnecting Means. Where acceptable to 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.

(F) 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.

(G) 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 (a) or (b):

(a) For a period of 1½ hours, without the voltage falling below 87½ percent of normal 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 1½ 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.

* * *

701.27 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 <u>No. 1</u>: Selective coordination shall not be required between two overcurrent devices located in series if no loads are connected in parallel with the downstream device.

<u>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.</u>

* * *

Section 43. The following sections of Article 705 of the National Electrical Code, 2017 Edition, are amended as follows:

Article 705

Interconnected Electric Power Production Sources

Part I. General

* * *

705.12 Point of Connection. The output of an interconnected electric power source shall be connected as specified in 705.12(A) or (B).

(A) Supply Side. An electric power production source shall be permitted to be connected to the supply side of the service disconnecting means as permitted in 230.82(6). The sum of the ratings of all overcurrent devices connected to power production sources shall not exceed the rating of the service.

(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.

(B) Load Side. 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, including switchgear, switchboards, or panelboards, is fed simultaneously by a primary source(s) of electricity and one or more other power source(s), and where this distribution equipment is capable of supplying multiple branch circuits or feeders, or both, the interconnecting provisions for other power sources shall comply with 705.12(B)(1) through (B)(5).

(1) 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.

(2) Bus or Conductor Ampere Rating. One hundred twenty-five percent of the power source output circuit current shall be used in ampacity calculations for the following:

(1) *Feeders.* 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 on the load side of the power source connection shall be rated not greater than the ampacity of the feeder.

(2) *Taps.* In systems where power source output connections are made at feeders, any taps shall be sized based on the sum of 125 percent of the power source(s) output circuit current and the rating of the overcurrent device protecting the feeder conductors as calculated in 240.21(B).

(3) *Busbars.* One of the methods that follows shall be used to determine the ratings of busbars in panelboards.

(a) 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.

(b) 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).

(c) 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).

(d) A connection at either end, but not both ends, 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.

(e) Connections shall be permitted on multiple-ampacity busbars where designed under engineering supervision that includes available fault current and busbar load calculations.

(3) 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.

(4) Suitable for Backfeed. Circuit breakers, if backfed, shall be suitable for such operation.

Informational Note: Fused disconnects, unless otherwise marked, are suitable for backfeeding.

(5) Fastening. Listed plug-in-type circuit breakers backfed 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.

* * *

Section 45. The following sections of Article 708 of the National Electrical Code, 2017 Edition, are amended as follows:

Article 708

Critical Operations Power Systems

(COPS)

* * *

Part IV. Overcurrent Protection

* * *

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 <u>No. 1</u>: Selective coordination shall not be required between two overcurrent devices located in series if no loads are connected in parallel with the downstream device.

<u>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.</u>

* * *

Section 46. The following sections of Article 760 of the National Electrical Code, 2017 Edition, are amended as follows:

ARTICLE 760

Fire Alarm Systems

Part I. General

* * *

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.

Section 47. 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 _____, 2017, and signed by me in open session in authentication of its passage this _____ day of _____, 2017.

_____

President _____ of the City Council

Approved by me this _____ day of _____, 2017.

_____

Mayor, _____

Filed by me this _____ day of _____, 2017.

_____

Monica Martinez Simmons, City Clerk

(Seal)