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 amending the 2023 National Electric Code, as set forth at Chapter 296-46B of the Washington Administrative Code (hereinafter WAC) and specifically incorporated in this Code are adopted. Informational Notes providing the WAC rule number, as the source of the Seattle amendment, are informational only.

80.3 Scope.
This Code applies to the installation, *alteration*, repair, relocation, replacement, addition to, use, or maintenance of electrical wiring, systems, and equipment, including communications systems and traffic management systems, within the City. The design and testing of *equipment* regulated by this Code are subject to the approval of the authority having jurisdiction.

(A) Traffic Management Systems. Traffic management systems provide signalization for controlling vehicular traffic, pedestrian traffic, or rolling stock. 2020 WAC 296-46B-010(15) through (22) are adopted as follows:

Traffic Management Systems.
(15) 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.
(f) A traffic management system can provide signalization for controlling vehicular traffic, pedestrian traffic, or rolling stock.

(16) 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).

(17) Associated induction detection loop or similar circuits will be accepted by the department or city authorized to do electrical inspections without inspection.

(18) 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.

(19) 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.

(20) 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.

(21) 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.

(22) 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) Installations 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. 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.

(2) Installations of communication equipment under exclusive control of communication utilities, located outdoors or in building spaces used exclusively for such installations.

(3) 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.

(4) 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 subsections (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 406.4(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 is 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

(5) located in a landmark or special review district subject to a requirement to obtain a certificate of approval before making a change to the external appearance of a structure.

80.6 Utilization Equipment and Alternative Material 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.

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 conducted 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 because 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, as amended by the Seattle Electrical Code, 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 containing the decision within 2 business days after the review and shall cause the order to be sent by first class mail to the person or persons requesting the review, any person on whom the stop work order was served, and any other person who requested a copy before issuance of the order, addressed to their last known address.

(D) Civil Actions and Penalties.

(1) Civil Penalties. Any person found violating or failing to comply with the provisions of this *Code* shall be subject to a cumulative civil penalty in an amount not to exceed $500 per day for each violation from the date the violation occurs or begins until compliance is achieved. In cases where the authority having jurisdiction has issued a notice of violation, the violation will be deemed to begin, for purposes of determining the number of days of violation, on the date compliance is required by the notice of violation.

(2) Enforcement in Municipal Court. Civil actions to enforce this chapter shall be brought exclusively in Seattle Municipal Court, except as otherwise required by law or court rule. In any civil action for a penalty, the City has the burden of proving by a preponderance of the evidence that a violation exists or existed; the issuance of a notice of violation or of an order following a review by the authority having jurisdiction is not itself evidence that a violation exists.

(3) Judicial Review. Because civil actions to enforce this *Code* must be brought exclusively in Seattle Municipal Court pursuant to Subsection 80.13(D)(2), orders of the authority having jurisdiction, including notices of violation issued under this chapter, are not subject to judicial review pursuant to chapter 36.70C RCW.

(4) Appeal to Superior Court. Final decisions of the Seattle Municipal Court on enforcement actions authorized by Title 22 and this *Code* may be appealed pursuant to the Rules for Appeal of Decisions of Courts of Limited Jurisdiction.

(E) Alternative Criminal Penalty. Anyone violating or failing to comply with any notice of violation or order issued by the authority having jurisdiction pursuant to this *Code* or who removes, mutilates, destroys, or conceals a notice issued or posted by the authority having jurisdiction shall, upon conviction thereof, be punished by a fine of not more than $5,000 or by imprisonment for not more than 365 days, or by both such fine and imprisonment for each separate violation. Each day's violation shall constitute a separate offense.

(F) Additional Relief. The authority having jurisdiction may seek legal or equitable relief to enjoin any acts or practices and abate any condition when necessary to achieve compliance.

80.14 Recording of Notices.
The authority having jurisdiction may record a copy of any order or notice with the Department of Records and Elections of King County.

The authority having jurisdiction may record with the Department of Records and Elections of King County a notice that a permit has expired without a final inspection after reasonable efforts have been made to obtain a final inspection.

80.15 Rules of the Authority Having Jurisdiction.
(A) Authority. The authority having jurisdiction has authority to issue interpretations of this *Code* and to adopt and enforce rules and regulations supplemental to this *Code* as may be deemed necessary in order to clarify the application of the provisions of this *Code*. Such interpretations, rules, and regulations shall be in conformity with the intent and purpose of this *Code.*

(B) Procedure for Adoption of Rules. The authority having jurisdiction shall promulgate, adopt, and issue rules according to the procedures as specified in the *Administrative Code,* Chapter 3.02 of the *Seattle Municipal Code*.

80.16 Construction Codes Advisory Board.
An Electrical Code Committee of the Construction Codes Advisory Board, as established in Section 105 of the Seattle Building Code, may examine proposed new editions of and amendments to this *Code* and any proposed administrative rules promulgated to enforce this *Code*. The Electrical Code Committee may make recommendations to the authority having jurisdiction and to the City Council relating to this *Code* and administrative rules. The committee may be called on an as-needed basis for the Construction Codes Advisory Board.

80.17 Administrative Review.
Prior to issuance of the electrical permit, applicants may request administrative review by the authority having jurisdiction of decisions or actions pertaining to the application and interpretation of this Code by the Construction Codes Advisory Board according to International Building Code Section 103.11, except for emergency orders, hazard correction orders, stop work orders, notices of violations, and revocations of permits. The Chair shall consider the subject of the review and members' expertise when selecting members to conduct a review. The decision of the review is advisory only; the final decision is made by the authority having jurisdiction.

III. Permits and Inspections
80.50 Permit Application.
(A) Permit Required. It shall be unlawful to install, alter, repair, replace, modify, extend, or connect any electrical equipment, or allow the same to be done, without first obtaining a permit for the work from the authority having jurisdiction, except as allowed in subsections (B) and (C) of this Section. A separate electrical permit is required for each separate building or structure.

Informational Note: See the "Smoke and Fire Protection Features" section in the *Seattle Building Code* for required protection methods when electrical work penetrates fire-resistance rated building elements.

(B) Like-in-Kind Replacement. An electrical permit shall not be required for the like-in-kind replacement of the following electrical equipment:

(1) no more than 5 single-family residential luminaires, snap switches, dimmers, receptacles, lamps, or luminaire ballasts with an identical ballast;

(2) a single set of fuses, a single battery smaller than 150 amp hour, or single lead acid batteries;

(3) circuit breakers, contactors, relays, timers, starters, circuit boards, thermostats, or similar control components. For the purpose of this section, "circuit breaker" means a circuit breaker that is used to provide overcurrent protection only for a branch circuit, as defined in NEC 100;

(4) household appliances when the equipment is reconnected to a circuit that was lawfully installed and approved, and no alteration of the circuit is necessary.

For the purpose of this section, a household appliance is defined as: Utilization equipment installed in a dwelling unit that is built in standardized sizes or types and is installed or connected as a unit to perform one or more household functions such as food preparation, cooking, and cleaning. Household appliances include but are not limited to appliances typically installed in a dwelling unit kitchen; clothes washing, drying, and water heating appliances; portable room air conditioning units and portable heaters; etc.

Fixed electric space-heating equipment covered in NEC 424 (furnaces, baseboard and wall heaters, electric heat cable, etc.) and fixed air-conditioning/heat pump equipment (NEC 440) are not household appliances.

Household appliance does not mean any utilization equipment that:
(a) Supplies electrical power, other than Class 2, to other utilization equipment; or
(b) Receives electrical power, other than Class 2, through other utilization equipment.

(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) 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 in one- and two-family dwellings.

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 business name, address, phone number for the project contact and contractor and the contractor's current contractor registration number with state license number of the licensed contractor, if a contractor has been selected;

(4) Be accompanied by construction documents, including plans, drawings, diagrams, computations and specifications, equipment schedules, and other data as required in Sections 80.54(B) and (C) when required by the authority having jurisdiction;

(5) State the valuation of the electrical work to be done. The valuation of the electrical work is the estimated current value of all labor and material, whether paid for or not, for which the permit is sought;

(6) Be electronically submitted by the owner of the property or building, or the owner's authorized agent, who may be required to submit evidence to indicate such authority;

(7) Give such other data and information as may be required by the authority having jurisdiction;

(8) State the name of the owner and the name, address, and phone number of a contact person;

(9) Substantially conform with applicable law in effect on the date described in Section R101.3, as modified by any exception; and

(10) Include documentation of compliance with the *Seattle Energy Code*.

The authority having jurisdiction may refuse to issue or may revoke a permit if any statement in the permit application is found to be untrue.

(B) Construction Documents for Plan Review.

(1) **General.** In addition to the requirements of Section 80.51(A), construction documents, including plans and specifications, shall be submitted with each electrical plan review or photovoltaic system permit application and in an electronic format approved by the authority having jurisdiction.

Construction documents for plan review shall be submitted for work that includes the following:

(a) services or feeders of 400 amperes or over;

(b) switches, and circuit breakers, 400 amperes and larger installed in 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 firepump systems;

(e) proposed alteration or installation, the scope of which covers more than 5,000 square feet;

(f) proposed alteration or installation which cannot be adequately described on the application form;

(g) new or altered electrical installations in educational, institutional, and health or personal care occupancies as required in 296-46B-900(1); (3)(a), (b), (c), (e), & (g); and WAC 269-46B-900 Tables 900-1 and 900-2; and

Exception to (a) through (g): Plan review applications will not be accepted for installations in one- and two-family dwelling structures that can be adequately described on the over-the-counter application form.

(h) photovoltaic and other renewable energy systems;

(i) energy storage system (ESS);

(j) New equipment or systems on a development site with three or more dwelling units or multiple buildings that are not regulated elsewhere in this section.

Construction documents and permit fees for photovoltaic and other renewable energy systems required by 80.51(B)(1)(h) shall be submitted and paid as follows:

(1) systems rated over 26 kW AC output shall submit plans and specifications, including system layout and all system components at the time of application (value based fee);
(2) systems rated 12 kW-26kW AC output shall submit plans and specifications, including system layout and all system components at the time of application (fixed fee);
(3) systems rated below 12 kW AC output shall upload supporting documents and one-line diagram for system installation to OTC permit.

(2) Fire Department Review. Electronic plans and specifications for fire alarm systems and energy storage systems (ESS) 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.

Informational Note: See Seattle TIP 106

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 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),

(8) transformer primary and secondary voltage, and kilovolt-amperes (KVA) rating, and

(9) smoke control fans

(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. Construction drawings provided for

the use of inspectors on the job site shall be in color and shall have minimum dimensions of 11" x 17" for photovoltaic installations and 24" x 30" or larger as required to be readable for all other installations. A copy of the electrical permit shall be posted in a conspicuous location on the premises at all times during the course of the installation or work.

(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:

(a) 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;

(b) 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

(c) 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

(d) 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.

(d) For PV systems, a cover inspection shall be required for any rooftop equipment before installation to verify suitability. Equipment must be on site at grade level for inspection.

(2) Final Inspection. The authority having jurisdiction is authorized to conduct a final inspection after all wiring has been completed and all permanent fixtures such as switches, outlet receptacles, plates, electric hot-water tanks, lighting fixtures and all other equipment have been properly installed. The permit holder shall call for a final inspection when the work described on the permit has been completed. Failure to obtain a final inspection is a violation of Section 80.13 of this Code.

(G) Other Inspections. In addition to the required inspections specified in Section 80.54(E), the authority having jurisdiction is authorized to conduct or require any other inspections of any construction work to ascertain compliance with the provisions of this Code and other laws enforced by the authority having jurisdiction.

Where work, for which any permit or approval is required, is commenced or performed prior to making formal application and receiving the authority having jurisdiction's permission to proceed, the authority having jurisdiction may make a special investigation inspection before a permit may be issued for the work. Where a special investigation is made, a special investigation fee may be assessed in accordance with Seattle Municipal Code, Title 22, Subtitle IX, Permit Fees.

If work that requires a permit or approval is commenced or performed prior to making formal application and receiving the authority having jurisdiction's permission to proceed, the authority having jurisdiction may make a special investigation inspection before a permit is issued for the work. If a special investigation is made, a special investigation fee may be assessed in accordance with Seattle Municipal Code, Title 22, Subtitle IX, Permit Fees.

(H) Corrections. Inspection corrections shall be completed and scheduled for re-inspection within 14 days of notice or reinspection fees may be applied.

(I) 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(D), Maintenance, the authority having jurisdiction or the fire chief may cause any structure to be reinspected.

The authority having jurisdiction may assess a reinspection fee as set forth in Seattle Municipal Code, Title 22, Subtitle IX, Permit Fees for any action listed above for which reinspection may be required.

In instances where reinspection fees have been assessed, no additional inspection of the work shall be performed until the required fees have been paid.

80.55 Fees. A fee for each electrical permit and for other activities related to the enforcement of this Code shall be paid as set forth in the Seattle Municipal Code, Title 22, Subtitle IX, Permit Fees.

NEC 70

National Electrical Code

2023 Edition

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REVISION SYMBOLS IDENTIFYING CHANGES FROM THE PREVIOUS EDITION: Text revisions are shaded. A Δ before a section number indicates that words within that section were deleted and a Δ to the left of a table or figure number indicates a revision to an existing table or figure. When a chapter was heavily revised, the entire chapter is marked throughout with the Δ symbol. Chapters, annexes, sections, figures, and tables that are new are indicated with an ***N***.

ARTICLE 90
Introduction

Article 90, Introduction, is not adopted.

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.~~))

Basement. The portion of a building that is partly or completely below grade plane. A basement will be considered as a story above grade plane and not a basement where the finished surface of the floor above the basement is either more than six feet above grade plane, more than six feet above the finished ground level for more than 50 percent of the total building perimeter, or more than 12 feet above the finished ground level at any point.

Development Site. A development site is a property boundary that the Seattle Department of Construction and Inspections (SDCI) uses to apply code standards, such as land use, building, and electrical code (at a minimum). A development site can be subdivided into multiple unit lots that allow for separate ownership (see *unit lot subdivision*).

EV-Ready. A minimum 40-ampere dedicated 208 or 240-volt branch circuit (32 amp output) terminated at a junction box or receptacle outlet in close proximity to a parking space.

Identification Plate. A label suitable for the environment that is a printed or etched adhesive label approved by the department or a phenolic or metallic plate or other similar material engraved in block letters at least 1/4 inch high unless specifically required to be larger by this chapter, suitable for the environment and application. The letters and the background must be in contrasting colors. Screws, rivets, or permanent adhesive must be used to affix an identification plate to the equipment or enclosure.

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 power lines, 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.

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. Also see ((~~to~~)) NFPA 70E-2021, 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. (CMP-10)~~

~~Informational Note: The service point can be described as the point of demarcation between where the serving utility ends and the premises wiring begins. The serving utility generally specifies the location of the service point based on the conditions of service.~~))

Service Terminal Box. An approved box to be used exclusively for the connection of the utility distribution system to the consumer's service entrance conductors.

Traffic Management System. A traffic management system provides signalization for controlling vehicular traffic, pedestrian traffic, or rolling stock and may be comprised of the following components:

(1) Traffic illumination systems;

(2) Traffic signal systems;

(3) Traffic monitoring systems;

(4) The electrical service cabinet and all related components and equipment installed on the load side of the service cabinet supplying electrical power to the traffic management system; and

(5) Signalization system(s) necessary for the operation of a light rail system.

Unit Lot Subdivision. A unit lot subdivision divides a development site into separate unit lots that allow for separate ownership.

Unobstructed Egress. Unobstructed egress (as applied to NEC 110.26 (C)(2)(a)) means an egress path that allows a worker to travel to the exit from any other area in the room containing the equipment described in NEC 110.26 (C)(2) without having to pass through that equipment's required working space.

Informational Note: The definition for "egress" found in WAC 296-46B-100 is incorporated herein with edits.

ARTICLE 110
Requirements for Electrical Installations

Part 1 General

110.1 General

(A) Scope. This article covers general requirements for the examination and approval, installation and use, access to and spaces about electrical conductors and equipment; enclosures intended for personnel entry; and tunnel installations.

(B) Electrical installations serving development sites. The conductors and equipment required or permitted by this code shall only supply one development site and shall not pass through another development site.

Informational Note: See Informative Annex J for information regarding ADA accessibility design.

110.2 Approval. The conductors and equipment required or permitted by this *Code* shall be ((~~acceptable~~)) approved only if ((~~approved~~)) the conductors or equipment meet minimum safety standards by conforming to applicable electrical product standards recognized by the authority having jurisdiction. Suitability of compliance may be demonstrated by listing or labeling from a National Recognized Testing Laboratory (NRTL).

Informational Note: See Sections 80.5, Testing, 90.7, Examination of Equipment for Safety, and 110.3, Examination, Identification, Installation, and Use of Equipment. ((~~See~~)) Also see Article 100 definitions of Approved, Identified, Labeled, and Listed.

110.11 Deteriorating Agents. Unless identified for use in the operating environment, no conductors or equipment shall be located in damp or wet locations; where exposed to gases, fumes, vapors, liquids, or other agents that have a deteriorating effect on the conductors or equipment; or where exposed to excessive temperatures.

Informational Note No. 1: See 300.6 for protection against corrosion.

Informational Note No. 2: Some cleaning and lubricating compounds can cause severe deterioration of many plastic materials used for insulating and structural applications in equipment.

Equipment not identified for outdoor use and equipment identified only for indoor use, such as “dry locations,” “indoor use only,” “damp locations,” or enclosure Types 1, 2, 5, 12, 12K, and/or 13, shall be protected against damage from the weather during construction.

Informational Note No. 3: See Table 110.28 for appropriate enclosure-type designations.

Informational Note No. 4: See *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)*, for information for minimum flood provisions.

(A) Exposure not identified for use in the operating environment. Electrical equipment and wiring submerged or exposed to water must comply with the following:

(1) All circuit breakers, fuses, controllers, receptacles, lighting switches or dimmers, electric heaters, and any sealed device or equipment (e.g., relays, contactors, etc.) must be replaced.

(2) All other electrical equipment (e.g., wiring, breaker panelboards, disconnect switches, switchgear, motor control centers, boiler controls, HVAC/R equipment, electric motors, transformers, appliances, water heaters, and similar appliances) must be replaced or reconditioned by the original manufacturer or by its approved representative. See Sections 210.15, 240.62, 240.88, 240.102 and 410.7 for equipment that is not permitted to be reconditioned. See also 110.21(A)(1).

Informational Note: WAC 296-46B-110(011), requirements for electrical equipment and wiring submerged or exposed to water, is incorporated herein.

110.12 Mechanical Execution of Work. Electrical equipment shall be installed in a professional and skillful manner.

Informational Note: See ANSI/NECA 1-2015, *Standard for Good Workmanship in Electrical Construction*, and other ANSI-approved installation standards for information on accepted industry practices.

(A) Unused Openings. Unused openings, other than those intended for the operation of equipment, those intended or mounting purposes, or those permitted as part of the design for listed equipment, shall be closed to afford protection substantially equivalent to the wall of the equipment. Where metallic plugs or plates are used with nonmetallic enclosures, they shall be recessed at least 6 mm (1/4 in.) from the outer surface of the enclosure.

(B) Integrity of Electrical Equipment and Connections. Internal parts of electrical equipment, including busbars, wiring terminals, insulators, and other surfaces, shall not be damaged or contaminated by foreign materials such as paint, plaster, cleaners, abrasives, or corrosive residues. There shall be no damaged parts that may adversely affect safe operation or mechanical strength of the equipment such as parts that are broken; bent; cut; or deteriorated by corrosion, chemical action, or overheating.

Δ (C) Cables and Conductors. Cables and conductors installed exposed on the surfaces of ceilings and sidewalls shall be supported by the building structure in such a manner that the cables and conductors will not be damaged by normal building use. Such cables and conductors shall be secured by hardware including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform with 300.4 and 300.11. Nonmetallic cable ties and other nonmetallic cable accessories used to secure and support cables in other spaces used for environmental air (plenums) shall be listed as having low smoke and heat release properties. Where straps or cable ties are installed exposed to sunlight, they shall be listed for exposure to ultraviolet light.

Informational Note No. 1: See NFPA 90A-2021, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, 4.3.11.2.6.5 and 4.3.11.5.5.6, for discrete combustible components installed in accordance with 300.22(C).

Informational Note No. 2: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants may result in an undetermined alteration of optical fiber cable properties.

110.13 Mounting and Cooling of Equipment.

(A) Mounting. Electrical equipment shall be firmly secured to the surface on which it is mounted. Wooden plugs riven into holes in masonry, concrete, plaster, or similar materials shall not be used.

(B) Cooling. Electrical equipment that depends on the natural circulation of air and convection principles for cooling of exposed surfaces shall be installed so that room airflow over such surfaces is not prevented by walls or by adjacent installed equipment. For equipment designed for floor mounting, clearance between top surfaces and adjacent surfaces shall be provided to dissipate rising warm air.

Electrical equipment provided with ventilating openings shall be installed so that walls or other obstructions do not prevent the free circulation of air through the equipment.

(C) Locations.

(1) **Required Egress.** Electrical equipment shall not project beyond the face of the wall or ceiling in halls, corridors, or other locations that would reduce the width or height required by the *Seattle Building Code* for such locations.

Informational Note: See Chapter 10 of the *Seattle Building Code* for prohibitions of electrical equipment within required means of egress system elements.

110.16 Arc-Flash Hazard Warning.

(A) General. Electrical equipment, such as switchboards, switchgear, enclosed panelboards, industrial control panels, meter socket enclosures, and motor control centers, that is in other than dwelling units, and is likely to require examination, adjustment, servicing, or maintenance while energized, shall be field or factory marked to warn qualified persons of potential electric arc flash hazards. The marking shall meet the requirements in 110.21(B) and shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

Δ **(B) Service Equipment and Feeder Supplied Equipment**. In other than dwelling units, in addition to the requirements in 110.16(A), a permanent arc flash label shall be field or factory applied to service equipment and feeder supplied equipment rated 1000 amperes or more. The arc flash label shall be in accordance with applicable industry practice and include the date the label was applied. 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 and feeder supplied equipment
(3) The clearing time of overcurrent protective devices supplying the equipment based on the available fault current at the equipment.
(4) The date the label was applied

Informational Note No. 1: See ANSI Z535.4-2011 (R2017), *Product Safety Signs and Labels*, for guidelines for the design of safety signs and labels for application to products.

Informational Note No. 2: See NFPA *70E*-2021, *Standard for Electrical Safety in the Workplace*, for applicable industry practices for equipment labeling. 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.

110.21 Marking.

(A) Equipment Markings.

Δ **(1) General.** The manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified shall be applied or affixed onto all electrical equipment. Other markings that indicate voltage, current, wattage, or other ratings shall be provided as specified elsewhere in this *Code*. The marking shall be of sufficient durability to withstand the environment involved.

(2) Reconditioned Equipment. Reconditioned equipment shall be marked with the following:

(1) Name, trademark, or other descriptive marking of the organization that performed the reconditioning

(2) The date of the reconditioning

(3) The term *reconditioned* or other approved wording or symbol indicating that the equipment has been reconditioned

The original listing mark shall be removed or made permanently illegible. The equipment nameplate shall not be required to be removed or made permanently illegible, only the part of the nameplate that includes the listing mark, if applicable. Approval of the reconditioned equipment shall not be based solely on the equipment's original listing.

Exception: In industrial occupancies, where conditions of maintenance and supervision ensure that only qualified persons service the equipment, the markings indicated in 110.21(A)(2) shall not be required for equipment that is reconditioned by the owner or operator as part of a regular equipment maintenance program.

Informational Note No. 1: ANSI-approved standards are available for application of reconditioned and refurbished equipment.

Informational Note No. 2: The term *reconditioned* may be interchangeable with the terms *rebuilt*, *refurbished*, or *remanufactured* even though these are sometimes different processes.

Δ (B) Field-Applied Hazard Markings. Where caution, warning, or danger hazard markings such as labels or signs are required by this *Code*, the markings shall meet the following requirements:

(1) The marking shall be of sufficient durability to withstand the environment involved and warn of the hazards using effective words, colors, symbols, or any combination thereof.

Informational Note No. 1: See ANSI Z535.2-2011 (R2017), *Environmental and Facility Safety Signs*, which describes the design, application, and use of safety signs in facilities and in the environment.

Informational Note No. 2: See ANSI Z535.4-2011 (R2017), *Product Safety Signs and Labels*, which details the design, application, use, and placement of safety signs and labels on a wide variety of products.

(2) The marking shall be permanently affixed to the equipment or wiring method and shall not be handwritten.

Exception to (2): Portions of the markings that are variable, or that could be subject to changes, shall be permitted to be handwritten and shall be legible.

(C) Other Marking or Labeling. Marking or labeling required by this Code shall be of sufficient durability to withstand the environment in which it is used. Unless otherwise required by this Code, both marking and labeling shall have lettering of not less than 6mm (1/4 in.) high and the letters shall be in contrast to the background. Marking or labeling shall be affixed using an identification plate as defined in Article 100.

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

Informational Note: The requirements of WAC 296-46B-110 022 are incorporated herein with edits.

110.22 Identification of Disconnecting Means.
(A) General. Each disconnecting means shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident. In other than one- or two-family dwellings, the marking shall include the identification and location of the circuit source that supplies the disconnecting means unless located and arranged so the identification and location of the circuit source 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 one- or two-family dwellings, the identification plate must include the identification designation of the circuit source panelboard that supplies the disconnecting means.

Informational Note: WAC 296-46B-110.022—requirements for identification of disconnecting means is incorporated herein.

(B) Engineered Series Combination Systems. Equipment enclosures for circuit breakers or fuses applied in compliance with series combination ratings selected under engineering supervision in accordance with 240.86(A) shall be legibly marked in the field as directed by the engineer to indicate the equipment has been applied with a series combination rating. The marking shall meet the requirements in 110.21(B) and shall be readily visible and state the following:

CAUTION — ENGINEERED SERIES COMBINATION SYSTEM RATED _____ AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.

(C) Tested Series Combination Systems. Equipment enclosures for circuit breakers or fuses applied in compliance with the series combination ratings marked on the equipment by the manufacturer in accordance with 240.86(B) shall be legibly marked in the field to indicate the equipment has been applied with a series combination rating. The marking shall meet the requirements in 110.21(B) and shall be readily visible and state the following:

CAUTION — SERIES COMBINATION SYSTEM RATED ____ AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.

Informational Note: See IEEE 3004.5-2014 *Recommended Practice for the Application of Low-Voltage Circuit Breakers in Industrial and Commercial Power Systems*, for further information on series tested systems.

110.26 Spaces About Electrical Equipment. Working space, and access to and egress from working space, shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment. Open equipment doors shall not impede access to and egress from the working space. Access or egress is impeded if one or more simultaneously opened equipment doors restrict working space access to be less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high.

(A) Working Space. Working space for equipment operating at 1000 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the dimensions of 110.26(A)(1), (A)(2), (A)(3), and (A)(4) or as required or permitted elsewhere in this Code.

Informational Note: See NFPA 70E-2021, *Standard for Electrical Safety in the Workplace*, for guidance, such as determining severity of potential exposure, planning safe work practices including establishing an electrically safe work condition, arc flash labeling, and selecting personal protective equipment.

Δ **(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, enclosed 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 or support structures, such as concrete pads, associated with the electrical installation and located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment.

Exception No. 1: On battery systems mounted on open racks, the top clearance shall comply with 480.10(D).

Exception No. 2: In existing dwelling units, service equipment or enclosed 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. 3: Meters that are installed in meter sockets shall be permitted to extend beyond the other equipment. The meter socket shall be required to follow the rules of this section.

(4) Limited Access. Where equipment operating at 1000 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized is required by installation instructions or function to be located in a space with limited access, all of the following shall apply:

(1) Where equipment is installed above a lay-in ceiling, there shall be an opening not smaller than 559 mm × 559 mm (22 in. × 22 in.), or in a crawl space, there shall be an accessible opening not smaller than 559 mm × 762 mm (22 in. × 30 in.).

(2) The width of the working space shall be the width of the equipment enclosure or a minimum of 762 mm (30 in.), whichever is greater.

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

(4) The space in front of the enclosure shall comply with the depth requirements of Table 110.26(A)(1) and shall be unobstructed to the floor by fixed cabinets, walls, or partitions. Space reductions in accordance with 110.26(A)(1)(b) shall be permitted. 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 provided the location of weight-bearing structural members does not result in a side reach of more than 150 mm (6 in.) to work within the enclosure.

(5) Separation from High-Voltage Equipment. Where switches, cutouts, or other equipment operating at 1000 volts, nominal, or less are installed in a vault, room, or enclosure where there are exposed live parts or exposed wiring operating over 1000 volts, nominal, the high-voltage equipment shall be effectively separated from the space occupied by the low-voltage equipment by a suitable partition, fence, or screen.

N **(6) Grade, Floor, or Working Platform.** The grade, floor, or platform in the required working space shall be kept clear, and the floor, grade, or platform in the working space shall be as level and flat as practical for the entire required depth and width of the working space.

(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.

Δ **(2) Large Equipment.** For large equipment that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high at each end of the working space. This requirement shall apply to either of the following conditions:

(1) For equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide

(2) For service disconnecting means installed in accordance with 230.71(B) where the combined ampere rating is 1200 amperes or more and where the combined width is over 1.8 m (6 ft)

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.

Δ **(3) Personnel Doors.** Where equipment rated 800 amperes or more that contains overcurrent devices, switching devices, or control devices is installed and there is a personnel door(s) intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the door(s) shall open at least 90 degrees in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.

Informational Note: See UL 305, *Standard For Panic Hardware*, for additional information on panic hardware, and see UL 10C, Standard for Safety for Positive Pressure Fire Tests of Door Assemblies, for additional information.

(D) Illumination. Illumination shall be provided for all working spaces about service equipment, switchboards, switchgear, enclosed panelboards, or motor control centers installed indoors. Control by automatic means shall not be permitted to control all illumination within the working space. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as permitted by 210.70(A)(1), Exception No. 1, for switched receptacles.

In residential installations, illumination shall be provided for all working spaces about panelboards that are located outdoors and contain branch circuits.

(E) Dedicated Equipment Space. All service equipment, 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 (E)(2)(c).

(a) *Installation Requirements*. Outdoor electrical equipment shall be the following:

(1) Installed in identified enclosures

(2) Protected from accidental contact by unauthorized personnel or by vehicular traffic

(3) Protected from accidental spillage or leakage from piping systems

(b) *Work Space*. The working clearance space shall include the zone described in 110.26(A). No architectural appurtenance or other equipment shall be located in this zone.

(c) *Dedicated Equipment Space*. The space equal to the width and depth of the equipment, and extending from grade to a height of 1.8 m (6 ft) above the equipment, shall be dedicated to the electrical installation. No piping or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Structural overhangs or roof extensions shall be permitted in this zone.

(F) Locked Electrical Equipment Rooms or Enclosures. Electrical equipment rooms or enclosures housing electrical apparatus that are controlled by a lock(s) shall be considered accessible to qualified persons.

110.30 General. Conductors and equipment used on circuits over 1000 volts, nominal, shall comply with Part I of this article and with 110.30 through 110.41, which supplement or modify Part I. In no case shall this part apply to equipment on the supply side of the service point.

Each cable operating at over 1,000 Volts and installed on customer-owned systems, must be legibly marked in a permanent manner at each termination point and at each point where the cable is accessible. The required marking must use phase designation, operating voltage, and circuit number, if applicable.

Informational Note: WAC 296-46B-110(030), Requirements for Marking Cable Over 1,000 volts, is incorporated herein.

Part VI Electrified Fences

110.100 Electrified Fences and Similar Devices. It is unlawful to place, or maintain, or allow to be placed, or maintained, any electric fence abutting upon the marginal line of any property in a manner that may be hazardous. Electrified fences, which deliver an intentional electric shock on contact, associated equipment, and similar devices shall be permitted only by special permission from the authority having jurisdiction.

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.

Informational Note: See 215.4 for information on common neutrals.

(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 requirement 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.

ARTICLE 210
Branch Circuits

Δ 210.8 Ground-Fault Circuit-Interrupter Protection for Personnel. A listed Class A GFCI shall provide protection in accordance with 210.8(A) through (F). The GFCI shall be installed in a readily accessible location.

Informational Note: See 215.9 for GFCI protection on feeders.

For the purposes of this section, the distance from receptacles shall be measured as the shortest path the power supply cord connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier.

Δ (A) Dwelling Units. All 125-volt through 250-volt receptacles installed in the following locations and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel:

(1) Bathrooms

(2) Garages and also accessory buildings that have a floor located at or below grade level not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use

(3) Outdoors

(4) Crawl spaces — at or below grade level

(5) Basements

(6) Kitchens

(7) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking

(8) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink

(9) Boathouses

(10) Bathtubs or shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall

(11) Laundry areas

(12) Indoor damp and wet locations

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: A receptacle supplying only a permanently installed premises security system shall be permitted to omit ground-fault circuit-interrupter protection.

Exception No. 3: Listed weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of supporting a ceiling luminaire or ceiling-suspended fan shall be permitted to omit ground-fault circuit-interrupter protection. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

Exception No. 4: Factory-installed receptacles that are not readily accessible and are mounted internally to bathroom exhaust fan assemblies shall not require GFCI protection unless required by the installation instructions or listing.

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

Exception No. 5 to 210.8 (A) (2) and (5): A receptacle installed in a garage or basement, supplying only a permanently installed fire alarm or burglar alarm system, shall not be required to have ground-fault circuit-interrupter protection. A red receptacle with a red cover plate supplying a fire alarm system is not required to have ground-fault circuit-interrupter protection. The receptacle must be identified for use only with the fire alarm system by an identification plate or engraved cover with letters at least 6.4 mm (1/4 in.) high.

Informational Note: WAC 296-46B-210 008 requirements for dwelling unit GFCI protection are incorporated herein with edits.

Δ **(B) Other Than Dwelling Units.** All 125-volt through 250-volt receptacles supplied by single-phase branch circuits rated 150 volts or less to ground, 50 amperes or less, and all receptacles supplied by three-phase branch circuits rated 150 volts or less to ground, 100 amperes or less, installed in the following locations shall be provided with GFCI protection:

(1) Bathrooms

(2) Kitchens

(3) Areas with ((~~sinks and~~)) permanent provisions for food preparation, beverage preparation, or cooking

(4) Buffet serving areas with permanent provisions for food serving, beverage serving, or cooking

(5) Rooftops

(6) Outdoors

(7) Sinks where receptacles or cord-and-plug-connected fixed or stationary appliances are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink

(8) Indoor damp or wet locations

(9) Locker rooms with associated showering facilities

(10) Garages, accessory buildings, service bays, and similar areas other than vehicle exhibition halls and showrooms

(11) Crawl spaces at or below grade level

(12) Unfinished areas of basements

(13) Aquariums, bait wells, and similar open aquatic vessels or containers, such as tanks or bowls, where receptacles are installed within 1.8 m (6 ft.) from the top inside edge or rim or from the conductive support framing of the vessel or container

(14) Laundry areas

(15) Bathtubs and shower stalls where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: Receptacles on rooftops shall not be required to be readily accessible other than from the rooftop.

Exception No. 3: Receptacles or cord-and-plug-connected fixed and stationary appliances installed within 1.8 m (6 ft) from the top inside edge of a bowl of a sink shall not be required to be GFCI protected in industrial establishments where the conditions of maintenance and supervision ensure that only qualified personnel are involved, an assured equipment grounding conductor

program in accordance with 590.6(B)(2) shall be permitted for only those receptacle outlets used to supply equipment that would create a greater hazard if power is interrupted or that has a design not compatible with GFCI protection.

Exception No. 4: Receptacles or cord-and-plug-connected fixed and stationary appliances installed within 1.8 m (6 ft) from the top inside edge of a bowl of a sink shall not be required to be GFCI protected in industrial laboratories where the receptacles are used to supply equipment if removal of power would introduce a greater hazard.

Exception No. 5: Receptacles located in patient bed locations of Category 2 (general care) or Category 1 (critical care) spaces of health care facilities shall be permitted to comply with 517.21.

Exception No. 6: Listed weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of serving a ceiling luminaire or ceiling-suspended fan shall be permitted to omit GFCI protection. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

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

Δ **(D) Specific Appliances.** GFCI protection shall be provided for the branch circuit or outlet supplying the following appliances rated 150 volts or less to ground and 60 amperes or less, single- or 3-phase:

(1) Automotive vacuum machines

(2) Drinking water coolers and bottle fill stations

(3) High-pressure spray washing machines

(4) Tire inflation machines

(5) Vending machines

(6) Sump pumps

(7) Dishwashers

(8) Electric ranges

(9) Wall-mounted ovens

(10) Counter-mounted cooking units

(11) Clothes dryers

(12) Microwave ovens

(E) Equipment Requiring Servicing. GFCI protection shall be provided for the receptacles required by 210.63.

Δ **(F) Outdoor Outlets.** For dwellings, all outdoor outlets, other than those covered in 210.8(A), Exception No. 1, including outlets installed in the following locations, and supplied by single-phase branch circuits rated 150 volts or less to ground, 50 amperes or less, shall be provided with GFCI protection:
(1) Garages that have floors located at or below grade level

(2) Accessory buildings

(3) Boathouses

If equipment supplied by an outlet covered under the requirements of this section is replaced, the outlet shall be supplied with GFCI protection.

Exception No. 1: GFCI protection shall not be required on lighting outlets other than those covered in 210.8(C).

Exception No. 2: GFCI protection shall not be required for listed HVAC equipment. This exception shall expire September 1, 2026.

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 220.11.

(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, one or more 120-volt, 20-ampere branch circuit shall be provided to supply bathroom(s) receptacle outlet(s) required by 210.52(D) and any countertop and similar work surface receptacle outlets. 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(B)(1) and (B)(2).

Δ **(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, including those required by 210.52(G)(1) for attached garages and in detached garages with electric power. This circuit shall have no other outlets.

Additional branch circuits rated 15 amperes or greater shall be permitted to serve receptacle outlets other than those required by 210.52(G)(1).

Exception No. 1: This circuit shall be permitted to supply outdoor receptacle outlets.

Exception No. 2: Where the 20-ampere circuit supplies a single vehicle bay garage, outlets for other equipment within the same garage shall be permitted to be supplied in accordance with 210.23(B)(1) and (B)(2).

(5) Other Required Branch Circuits. 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 area. If the total adjacent unfinished space area 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: The requirements of WAC-46B-210 011 are incorporated herein.

210.12 Arc-Fault Circuit-Interrupter Protection. Arc-fault circuit-interrupter (AFCI) protection shall be installed in accordance with 210.12(B) through (E) by any of the means described in 210.12(A)(1) through (A)(6). The AFCI shall be listed and installed in a readily accessible location.

Δ **(A) Means of Protection.** AFCI protection shall be provided by any of the following means:

(1) A listed combination-type AFCI 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 AFCI installed on the branch circuit at the first outlet box, which shall be marked to indicate that it is the first outlet of the branch 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 AFCI installed on the branch circuit at the first outlet box if 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 AFCI.

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 shall be marked to indicate that it is the first outlet of the branch circuit.

(4) A listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet in combination with a listed branch-circuit overcurrent protective device if 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 AFCI.

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 shall be marked to indicate that it is the first outlet of the branch 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 listed as such.

(5) If metal raceway, metal wireways, metal auxiliary gutters, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, metal conduit bodies, and metal enclosures are installed for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install a listed outlet branch-circuit-type AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.

(6) Where a listed metal or nonmetallic conduit or tubing or Type MC cable is encased in not less than 50 mm (2 in.) of concrete for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install a listed outlet branch-circuit-type AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.

Informational Note: See UL 1699-2011, Standard for Arc-Fault Circuit-Interrupters, for information on combination-type and branch/feeder-type AFCI devices. See UL Subject 1699A, Outline of Investigation for Outlet Branch Circuit Arc-Fault Circuit-Interrupters, for information on outlet branch-circuit type AFCI devices. See UL Subject 1699C, Outline of Investigation for System Combination Arc-Fault Circuit Interrupters, for information on system combination AFCIs.

N **(B) Dwelling Units.** All 120-volt, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A)(1) through (A)(6):

(1) Kitchens

(2) Family rooms

(3) Dining rooms

(4) Living rooms

(5) Parlors

(6) Libraries

(7) Dens

(8) Bedrooms

(9) Sunrooms

(10) Recreation rooms

(11) Closets

(12) Hallways

(13) Laundry areas

(14) Similar areas

Exception No. 1: AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B). The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, conduit bodies, and enclosures.

Exception No. 2: AFCI protection shall not be required for the individual branch circuit supplying an outlet for arc welding equipment in a dwelling unit until January 1, 2025.

Informational Note No. 1: See NFPA 72-2022, National Fire Alarm and Signaling Code, 29.9.4(5), for information on secondary power source requirements for smoke alarms installed in dwelling units.

Informational Note No. 2: See 760.41(B) and 760.121(B) for power source requirements for fire alarm systems.

(C) Dormitory Units, Boarding Houses, and Congregate Living Facilities. All 120-volt, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A)(1) through (A)(6):

(1) Bedrooms

(2) Living rooms

(3) Hallways

(4) Closets

(5) Bathrooms

(6) Similar rooms

(D) Other Occupancies. All 120-volt, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A)(1) through (A)(6):

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

(2) Areas used exclusively as patient sleeping rooms in nursing homes and limited-care facilities

(3) Areas designed for use exclusively as sleeping quarters in fire stations, police stations, ambulance stations, rescue stations, ranger stations, and similar locations

Δ **(E) Branch Circuit Wiring Extensions, Modifications, or Replacements.** If branch-circuit wiring for any of the areas specified in 210.12(B), (C), or (D) is modified, replaced, or extended, the branch circuit shall be protected by one of the following:

(1) By any of the means described in 210.12(A)(1) through (A)(6)

(2) A listed outlet branch-circuit-type AFCI located at the first receptacle outlet of the existing branch circuit

Exception: AFCI protection shall not be required where the extension of the existing branch-circuit conductors is not more than 1.8 m (6 ft) and does not include any additional outlets or devices, other than splicing devices. This measurement shall not include the conductors inside an enclosure, cabinet, or junction box.

Δ **210.13 Ground-Fault Protection of Equipment.** Each branch-circuit disconnecting means rated 1000 amperes or more and installed on solidly grounded wye electrical systems of more than 150 volts to ground, but not exceeding 1000 volts phase-to-phase, shall be provided with ground-fault protection of equipment in accordance with 230.95.

Equipment ground fault protection systems required by the NEC must be tested prior to being placed into service to verify proper installation and operation of the system as determined by the manufacturer's published instructions. A firm having qualified personnel and proper equipment must perform the tests required. A copy of the manufacturer's performance testing instructions and a written performance acceptance test record signed by the person performing the test must be available at the time of inspection. The performance acceptance test record must include test details including, but not limited to, all trip settings and measurements taken during the test.

Informational Note 1: See 517.17 for requirements on buildings that contain health care occupancies.

Informational Note 2: The requirements of *WAC 296-46B-210 013* are incorporated herein

Exception No. 1: This section shall not apply to a disconnecting means for a continuous industrial process where a nonorderly shutdown will introduce additional or increased hazards.

Exception No. 2: This section shall not apply if ground-fault protection of equipment is provided on the supply side of the branch circuit and on the load side of any transformer supplying the branch circuit.

210.25 Branch Circuits in Buildings and Development Sites 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 lighting, central alarm, signal, communications, or other purposes for public or common areas of a two-family dwelling, a multifamily dwelling, multi-occupancy building, or development site with more than one dwelling unit, shall not be supplied from equipment that supplies an individual dwelling unit or tenant space.

Exception to B: lighting for common exterior areas not exceeding 50 watts and controlled by a photocell and occupancy sensor.

Informational Note: Examples of public or common areas include, but are not limited to, lobbies, corridors, stairways, laundry rooms, roofs, elevators, washrooms, store rooms, driveways (parking), and mechanical rooms.

(C) Shared Sump Pump, Septic or Water Well. Branch circuits supplying loads for sump pump, septic or water well systems that are shared by no more than two dwelling units, not including accessory dwelling units, may be supplied from either of the two dwelling units if approved by the authority having jurisdiction and local health department.

Informational Note: WAC 296-46B-210.25, requirements for common area branch circuits for shared septic or water well systems, is incorporated herein with edits

210.52 Dwelling Unit Receptacle Outlets. This section provides requirements for 125-volt, 15- and 20-ampere receptacle outlets. The receptacles required by this section shall be in addition to any receptacle that is as follows:

(1) Part of a luminaire or appliance, or

(2) Controlled by a listed wall-mounted control device in accordance with 210.70(A)(1), Exception No. 1, or

(3) Located within cabinets or cupboards, or

(4) Located more than 1.7 m (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 2023 National Electric Code.

(A) General Provisions. In every kitchen, family room, dining room, living room, parlor, library, den, sunroom, bedroom, recreation room, or similar room or area of dwelling units, receptacle outlets shall be installed in accordance with the general provisions specified in 210.52(A)(1) through (A)(4).

(1) Spacing. Receptacles shall be installed such that no point measured horizontally along the floor line of any wall space is more than 1.8 m (6 ft) from a receptacle outlet.

(2) Wall Space. As used in this section, a wall space shall include the following:

(1) Any space 600 mm (2 ft) or more in width (including space measured around corners) and unbroken along the floor line by doorways and similar openings, fireplaces, stationary appliances, and fixed cabinets ((~~that do not have countertops or similar work surfaces~~))or bookcases that extend from the floor to a level at least 1.7 m (5 ft 6 inches) above the floor, and similar openings. Any outlet eliminated by window seating, bookcases, cabinets, or other permanent part of the dwelling configuration or finish must be installed elsewhere within the room

(2) The space occupied by fixed panels in walls, excluding sliding panels

(3) The space afforded by fixed room dividers, such as freestanding bar-type counters or railings

Informational Note: WAC 296-46B-210.052(A)(2)(7) explaining similar openings is incorporated herein with edits.

(3) Floor Receptacles. Receptacle outlets in or on floors shall not be counted as part of the required number of receptacle outlets unless located within 450 mm (18 in.) of the wall.

(4) Countertop 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 receptacle outlets required by 210.52(A).

(B) Small Appliances.

Δ **(1) Receptacle Outlets Served.** In the kitchen, pantry, breakfast room, dining room, or similar area of a dwelling unit, the two or more 20-ampere small-appliance branch circuits required by 210.11(C)(1) shall serve all wall and floor receptacle outlets covered by 210.52(A), all countertop outlets covered by 210.52(C), and receptacle outlets for refrigeration equipment.

Exception No. 1: In addition to the required receptacles specified by 210.52, switched receptacles supplied from a general-purpose 15- or 20-ampere branch circuit shall be permitted in accordance with 210.70(A)(1), Exception No. 1.

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) shall be permitted to be served by a small-appliance branch circuit.

Exception No. 2: Receptacles installed to provide power for supplemental equipment and lighting on gas-fired ranges, ovens, or counter-mounted cooking units shall be permitted to be served by a small-appliance branch circuit.

(3) Kitchen Receptacle Requirements. Receptacles installed in a kitchen to serve countertop surfaces shall be supplied by not fewer than two small-appliance branch circuits, either or both of which shall also be permitted to supply receptacle outlets in the same kitchen and in other rooms specified in 210.52(B)(1). Additional small-appliance branch circuits shall be permitted to supply receptacle outlets in the kitchen and other rooms specified in 210.52(B)(1). No small-appliance branch circuit shall serve more than one kitchen.

(C) Countertops and Work Surfaces. In kitchens, pantries, breakfast rooms, dining rooms, and similar areas of dwelling units, receptacle outlets for countertop and work surfaces that are 300 mm (12 in.) or wider shall be installed in accordance with 210.52(C)(1) through (C)(3) and shall not be considered as the receptacle outlets required by 210.52(A).

For the purposes of this section, where using multioutlet assemblies, each 300 mm (12 in.) of multioutlet assembly containing two or more receptacles installed in individual or continuous lengths shall be considered to be one receptacle outlet.

(1) Wall Spaces. Receptacle outlets shall be installed so that no point along the wall line is more than 600 mm (24 in.) measured horizontally from a receptacle outlet in that space. The location of the receptacles shall be in accordance with 210.52(C)(3).

Exception No. 1: Receptacle outlets shall not be required directly behind a range, counter-mounted cooking unit, or sink in the installation described in Figure 210.52(C)(1).

Exception No. 2: Where a required receptacle outlet cannot be installed in the wall areas shown in Figure 210.52(C)(1), the receptacle outlet shall be permitted to be installed as close as practicable to the countertop area to be served. The total number of receptacle outlets serving the countertop shall not be less than the number needed to satisfy 210.52(C)(1). These outlets shall be located in accordance with 210.52(C)(3).

Δ ***N*** **(2) Island and Peninsular Countertops and Work Surfaces.** Receptacle outlets, if installed to serve an island or peninsular countertop or work surface, shall be installed in accordance with 210.52(C)(3). If a receptacle outlet is not provided to serve an island or peninsular countertop or work surface, no future provisions to do so are required. ((~~provisions shall be provided at the island or peninsula for future addition of a receptacle outlet to serve the island or peninsular countertop or work surface.~~))

Informational Note: The exception of WAC 296-46b-210 052 (C)(2)(8) is incorporated herein.

Δ **(3) Receptacle Outlet Location.** Receptacle outlets shall be located in one or more of the following:

(1) On or above, but not more than 500 mm (20 in.) above, a countertop or work surface

(2) In a countertop using receptacle outlet assemblies listed for use in countertops

(3) In a work surface using receptacle outlet assemblies listed for use in work surfaces or listed for use in countertops

Receptacle outlets rendered not readily accessible by appliances fastened in place, appliance garages, sinks, or rangetops as covered in 210.52(C)(1), Exception No. 1, or appliances occupying assigned spaces shall not be considered as these required outlets.

Informational Note No. 1: See 406.5(E) for installation of receptacles in countertops and 406.5(F) for installation of receptacles in work surfaces. See 380.10 for installation of multioutlet assemblies.

Informational Note No. 2: See Informative Annex J and ANSI/ICC A117.1-2009, Standard on Accessible and Usable Buildings and Facilities, for additional information.

(D) Bathrooms. At least one receptacle outlet shall be installed in bathrooms within 900 mm (3 ft) of the outside edge of each sink. The receptacle outlet shall be located on a wall or partition that is adjacent to the sink or sink countertop, located on the countertop, or installed on the side or face of the sink cabinet. In no case shall the receptacle be located more than 300 mm (12 in.) below the top of the sink or sink 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 on installation of receptacles in countertops.

Δ **(E) Outdoor Outlets.** Outdoor receptacle outlets shall be installed in accordance with 210.52(E)(1) through (E)(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 within 102 mm (4 in.) horizontally of the dwelling unit shall have at least one receptacle outlet accessible from the balcony, deck, or porch. The receptacle outlet shall not be located more than 2.0 m (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, and multifamily dwellings, at least one receptacle outlet shall be installed in the areas specified in 210.52(G)(1) through (G)(3). These receptacles shall be in addition to receptacles required for specific equipment. Receptacles supplying only a permanently installed premises security system shall not be considered as meeting these requirements.

(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.

Exception: Garage spaces not attached to an individual dwelling unit of a multifamily dwelling shall not require a receptacle outlet in each vehicle bay.

(2) Accessory Buildings. In each accessory building with electric power.

(3) Basements. In each separate unfinished portion of a basement.

(H) Hallways. In dwelling units, hallways of 3.0 m (10 ft) or more in length shall have at least one receptacle outlet.

As used in this subsection, the hallway length shall be considered the length along the centerline of the hallway without passing through a doorway.

(I) Foyers. Foyers that are not part of a hallway in accordance with 210.52(H) and that have an area that is greater than 5.6 m2 (60 ft2) shall have a receptacle(s) located in each wall space 900 mm (3 ft) or more in width. Doorways, door-side windows that extend to the floor, and similar openings shall not be considered wall space.

210.65 Meeting Rooms.

(A) General. Each meeting room of not more than 93 m2 (1000 ft2) in other than dwelling units shall have outlets for nonlocking-type, 125-volt, 15- or 20-ampere receptacles. The outlets shall be installed in accordance with 210.65(B). Where a room or space is provided with movable partition(s), each room size shall be determined with the partition in the position that results in the smallest size meeting room.

Informational Note No. 1: For the purposes of this section, meeting rooms are typically designed or intended for the gathering of seated occupants for such purposes as conferences, deliberations, or similar purposes, where portable electronic equipment such as computers, projectors, or similar equipment is likely to be used.

Informational Note No. 2: Examples of rooms that are not meeting rooms include auditoriums, schoolrooms, and coffee shops.

(B) Receptacle Outlets Required. The total number of receptacle outlets, including floor outlets and receptacle outlets in fixed furniture, shall not be less than as determined in 210.65(B)(1) and (B)(2).

(1) Receptacle Outlets in Fixed Walls. The required number of receptacle outlets shall be determined in accordance with 210.52(A)(1) through (A)(4). These receptacle outlets shall be permitted to be located as determined by the installer, designer, or building owner.

Δ **(2) Floor Outlets.** A meeting room with any floor dimension that is 3.7 m (12 ft) or greater in any direction and that has a floor area of at least 20 m2 (215 ft2) shall have at least one floor receptacle outlet, or at least one floor outlet to serve a receptacle(s), located at a distance not less than 1.8 m (6 ft) from any fixed wall for each 20 m2 (215 ft2) or fraction thereof.

Informational Note No. 1: See 314.27(B) for requirements on floor boxes used for receptacles located in the floor.

Informational Note No. 2: See 518.1for requirements on assembly occupancies designed for 100 or more persons.

ARTICLE 215
Feeders

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.

(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 Multifamily Dwellings. Individual units of multifamily dwellings shall not be supplied by more than one feeder except by special permission from the authority having jurisdiction.

215.14 Dwelling Units Supplied Through Other Dwelling Units.
Feeder conductors supplying an individual dwelling unit shall not pass through the interior of another dwelling unit if that dwelling unit is located on a different unit lot of a unit lot subdivision. A unit lot subdivision divides a development site into separate unit lots that allow for separate ownership.

Informational Note: See SMC 23.22.062 for information on unit lot subdivisions.

ARTICLE 220
Branch-Circuit, Feeder, and Service Load

220.42 Lighting Load for Non-Dwelling Occupancies.

(A) General. A unit load of not less than that specified in Table 220.42(A) for non-dwelling occupancies and the floor area determined in 220.5(C) shall be used to calculate the minimum lighting load. Motors rated less than 1⁄8 HP and connected to a lighting circuit shall be considered general lighting load.

Informational Note: The unit values of Table 220.42(A) are based on minimum load conditions and 80 percent power factor and might not provide sufficient capacity for the installation contemplated.

(B) Energy Code. Where the building is designed and constructed to comply with an energy code adopted by the local authority, the lighting load shall be permitted to be calculated using the unit values specified in the energy code where the following conditions are met:

~~(((1) A power monitoring system is installed that will provide continuous information regarding the total general lighting load of the building.~~

~~(2) The power monitoring system will be set with alarm values to alert the building owner or manager if the lighting load exceeds the values set by the energy code. Automatic means to take action to reduce the connected load shall be permitted.~~))

(1) The demand factors specified in 220.45 are not applied to the general lighting load.

(2) The continuous load multiplier of 125 percent shall be applied.

Informational Note: See Section 405 of the 2021 Seattle Energy Code for the unit values.

220.51 Fixed Electric Space Heating.
Fixed electric space-heating loads shall be calculated at 100 percent of the total connected load. However, in no case shall a feeder or service load current rating be less than the rating of the largest branch circuit supplied.

Exception: ((~~If reduced loading of the conductors results from units operating on duty cycle or intermittently, or from all units not operating at the same time, the authority having jurisdiction shall be permitted to grant permission for feeder and service conductors to have an ampacity less than 100 percent if 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).
Applying a demand factor of 75 percent to the nameplate rating load of four or more appliances rated 1⁄4 hp or greater, or 500 watts or greater, that are fastened in place, and that are served by the same feeder or service in a one-family, two-family, or multifamily dwelling shall be permitted. This demand factor shall not apply to the following:

(1) Household electric cooking equipment that is fastened in place

(2) Clothes dryers

(3) Space heating equipment

(4) Air-conditioning equipment

(5) Electric vehicle supply equipment (EVSE)

N **220.57 Electric Vehicle Supply Equipment (EVSE) Load.**
The EVSE load shall be calculated ((~~at either 7200 watts (volt-amperes) or the nameplate rating of the equipment, whichever is larger~~)) in accordance with the requirements of Seattle Electrical Code Article 625.

N **220.70 Energy Management Systems (EMSs).**
If an energy management system (EMS) is used to limit the current to a feeder or service in accordance with 750.30, a single value equal to the maximum ampere setpoint of the EMS shall be permitted to be used in load calculations for the feeder or service.

The setpoint value of the EMS shall be considered a continuous load for the purposes of load calculations.

For new service installations, no branch-circuit, feeder or service load calculations required under Article 220 may be reduced by EMS.

220.84 Multifamily Dwelling.

(A) Feeder or Service Load. It shall be permissible to calculate the load of a feeder or service that supplies three or more dwelling units of a multifamily dwelling in accordance with Table 220.84(B) instead of Part III of this article if all the following conditions are met:

(1) No dwelling unit is supplied by more than one feeder.

(2) Each dwelling unit is equipped with electric cooking equipment.

Exception: When the calculated load for multifamily dwellings without electric cooking in Part III of this article exceeds that calculated under Part IV for the identical load plus electric cooking (based on 8 kW per unit), the lesser of the two loads shall be permitted to be used.

(3) Each dwelling unit is equipped with either electric space heating or air conditioning, or both. Feeders and service conductors whose calculated load is determined by this optional calculation shall be permitted to have the neutral load determined by 220.61.

Exception: When the calculated load for multifamily dwellings without electric heating or air conditioning, or both in Part III of this article exceeds that calculated under Part IV for the identical load plus electric heating (based on 5 W per square foot or the actual heat loss calculations based on the energy code at 150% as approved by the mechanical review in BTU), the lesser of the two loads shall be permitted to be used.

(B) House Loads. House loads shall be calculated in accordance with Part III of this article and shall be in addition to the dwelling unit loads calculated in accordance with Table 220.84(B).

(C) Calculated Loads. The calculated load to which the demand factors of Table 220.84(B) apply shall include the following:

(1) 33 volt-amperes/m2 or 3 volt-amperes/ft2 for general lighting and general-use receptacles

(2) 1500 volt-amperes for each 2-wire, 20-ampere small-appliance branch circuit and each laundry branch circuit covered in 210.11(C)(1) and (C)(2)

(3) The nameplate rating of the following:

a. All appliances, including EV supply equipment when supplied from a unit, that are fastened in place, permanently connected, or located to be on a specific circuit

b. Ranges, wall-mounted ovens, counter-mounted cooking units

c. Clothes dryers that are not connected to the laundry branch circuit specified in item (2)

d. Water heaters

(4) The nameplate ampere or kVA rating of all permanently connected motors not included in item (3)

(5) The larger of the air-conditioning load or the fixed electric space-heating load

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 guy wires to safely withstand the strain imposed by the overhead feeder or branch-circuit conductors. Hubs intended for use with a conduit serving as a mast for support of feeder or branch-circuit conductors shall be identified for use with a mast.~~

~~**(B) Attachment.** Feeder and/or branch-circuit conductors shall not be attached to a mast where the connection is between a weatherhead or the end of the conduit and a coupling where the coupling is located above the last point of securement to the building or other structure, or where the coupling is located above the building or other structure~~.))

Δ **225.31 Disconnecting Means.**

N **(A) General.** Means shall be provided for disconnecting all ungrounded conductors that supply or pass through the building or structure.

Δ **(B) Location.** 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 apply.

Exception No. 1: For installations under single management, where documented safe switching procedures are established and maintained, 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 685.1, 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 600.1, the disconnecting means shall be permitted to be located elsewhere on the premises.

Exception No. 5: If 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 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 of and within 15 feet of the building or structure. The building disconnecting means may supply only one building or structure unless means function as the building or structure main disconnect(s).

(C) A Generator Disconnecting Means. A generator disconnecting means, is not required to be suitable for use as service equipment when there is a feeder disconnecting means, located elsewhere on the premises, with overcurrent protection sized for the feeder conductors.

Informational Note: WAC 296-46B-225.031 requirements for the location of outside feeder disconnecting means is incorporated herein.

ARTICLE 230
Services

Δ **230.1 ((~~Scope~~)) General.**

(A) Scope. This article covers service conductors and equipment for control and protection of services not over 1000 volts ac or 1500 volts dc, nominal and their installation requirements.

Informational Note No. 1: See Informational Note Figure 230.1 in 2023 National Electrical Code.

Informational Note No. 2: See Part V of Article 235 for services over 1000 volts ac or 1500 volts dc, nominal.

(B) Service Requirements. The serving utility shall be consulted by the owner, the owner's agent, or the contractor making the installation to ensure compliance with the utility's requirements for electrical service connection. This includes, but is not limited to, requirements for location, clearances, and equipment.

Informational Note: See Seattle City Light's *Requirements for Electrical Service Connection* for information on specific utility requirements for service connection.

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) Interconnected electric power production sources

(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 2000 amperes at a supply voltage of 1000 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 supply equipment (EVSE)

(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.

230.4 Service Entrance Conductors Serving Development Sites.
Service entrance conductors from one development site shall not serve another development site or premises.

230.5 Types of Services.
All services shall be grounded single-phase or grounded three-phase 4-wire systems. Three-phase 3-wire services shall not be installed unless prior approval is granted by the utility and the authority having jurisdiction.

230.12 Service Point Connection.
Service point connections shall comply with paragraphs (A), (B) or (C) below.

(A) Overhead Service-drop. For overhead service-drop conductors from the utility pole to the point of attachment to the building, connections of the service entrance conductors shall be at a weatherhead outside the building.

(B) Underground Service Connections Outside of Buildings. For underground service connections outside of buildings, connection shall be made in one of the following:

(1) a service terminal box or current transformer cabinet;

(2) a handhole or power transformer installed outdoors in accordance with requirements of the utility, the Seattle Building Code, or any other applicable ordinance;

(3) A meter socket(s) of 200 amperes minimum size, direct-metered;

(4) A termination compartment of service equipment that is used exclusively for the connection of the utility distribution system.

(C) Underground Service Connections Inside of Buildings. For underground service connections inside of buildings, connection shall be made at one of the following:

(1) Where utility-supplied conductors are used:

(a) service terminal box or current transformer cabinet connected by no more than 457 mm (18 in.) of rigid steel or rigid nonmetallic conduit inside the building;

(b) a direct metered, meter socket of 200 amperes minimum size mounted in a perimeter wall of a single-family dwelling connected by no more than 2.4 m (8 ft) of rigid steel or rigid nonmetallic conduit inside the building;

(c) a termination or current transformer section of built, sectionalized service equipment that is used exclusively for the connection of the utility distribution system. This section must be fed from underground or concrete encased conduit and the service equipment must be set directly on the floor or a concrete house

(2) a transformer vault within the building

230.20 Overhead Service Conductors.

For systems rated 1000 volts or less, service entrance conductors beyond the service point shall not be installed as overhead conductors.

230.22((~~Insulation or Covering.~~ ~~Individual conductors shall be insulated or covered.~~)) **Not adopted.**

((~~*Exception: The grounded conductor of a multiconductor cable shall be permitted to be bare.*~~))

230.23 ((~~Size and Ampacity~~)) Not adopted.

((~~**(A) General.** Conductors shall have sufficient ampacity to carry the current for the load as calculated in accordance with Parts II through V of 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).~~))

230.27 ((~~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~~.)) **Not adopted.**

230.28 Service Masts as Supports. Only electrical utility((~~power service-drop or overhead service~~)) conductors shall be ((~~permitted to be~~)) attached to a service mast. Service masts used for the support of electrical utility ((~~service-drop or overhead service drops~~)) conductors shall ((~~be installed in accordance with 230.28(A) and (B).~~)) comply with all of the following:

((~~**(A) Strength.** The service mast shall be of adequate strength or be supported by braces or guy wires to withstand safely the strain imposed by the service-drop or overhead service conductors. Hubs intended for use with a conduit that serves as a service mast shall be identified for use with service-entrance equipment.~~

~~**(B) Attachment.** Service-drop or overhead service conductors shall not be attached to a service mast between a weatherhead or the end of the conduit and a coupling, where the coupling is located above the last point of securement to the building or other structure or is located above the building or other structure.~~))

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

(2) Have raceway fittings identified for use with galvanized rigid steel (GRC).

(3) Support only electric utility conductors.

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

(5) 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.

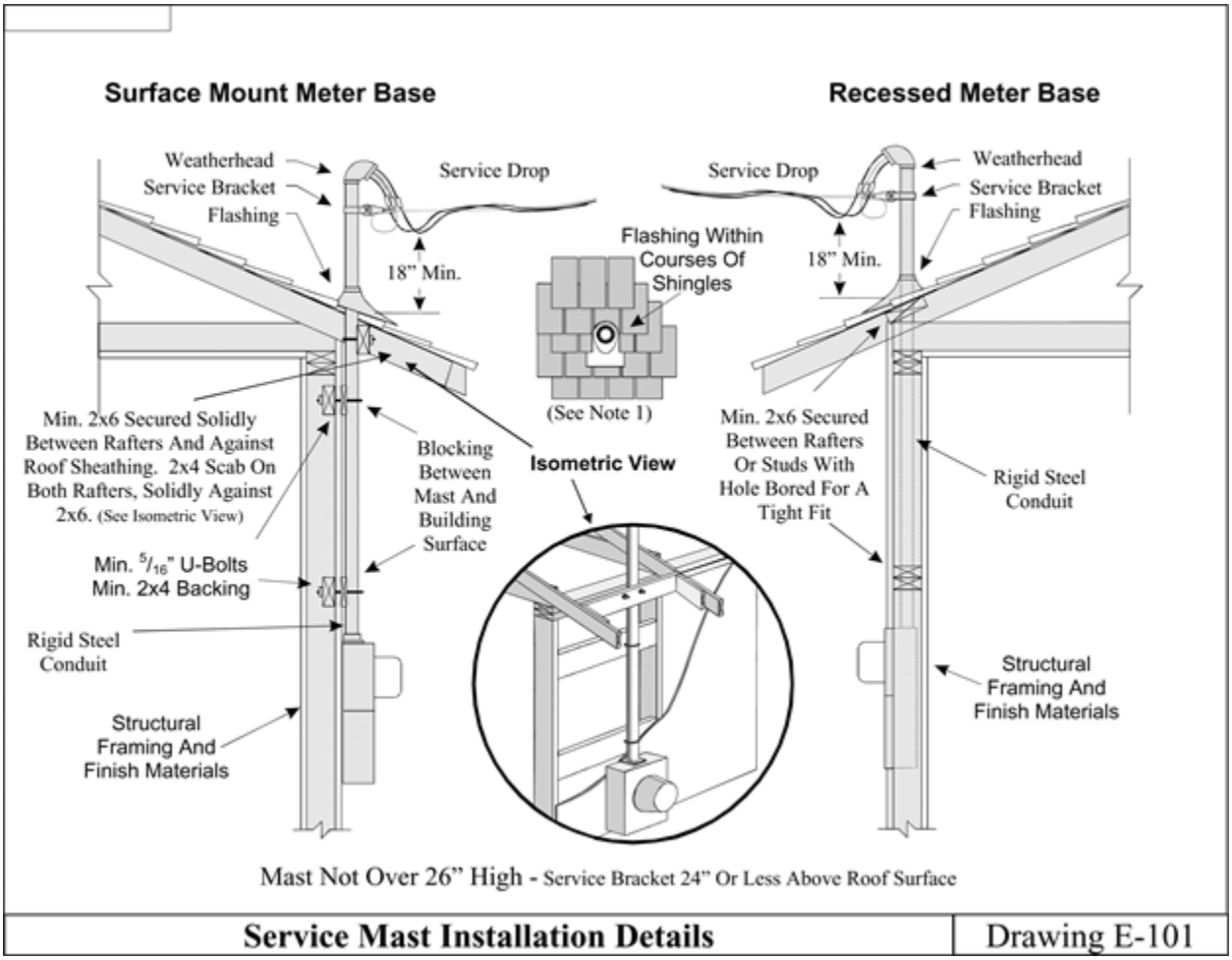
(6) Be rigidly supported with brackets or guy wires for masts extending over 661 mm (26 in.) from upper supporting means.

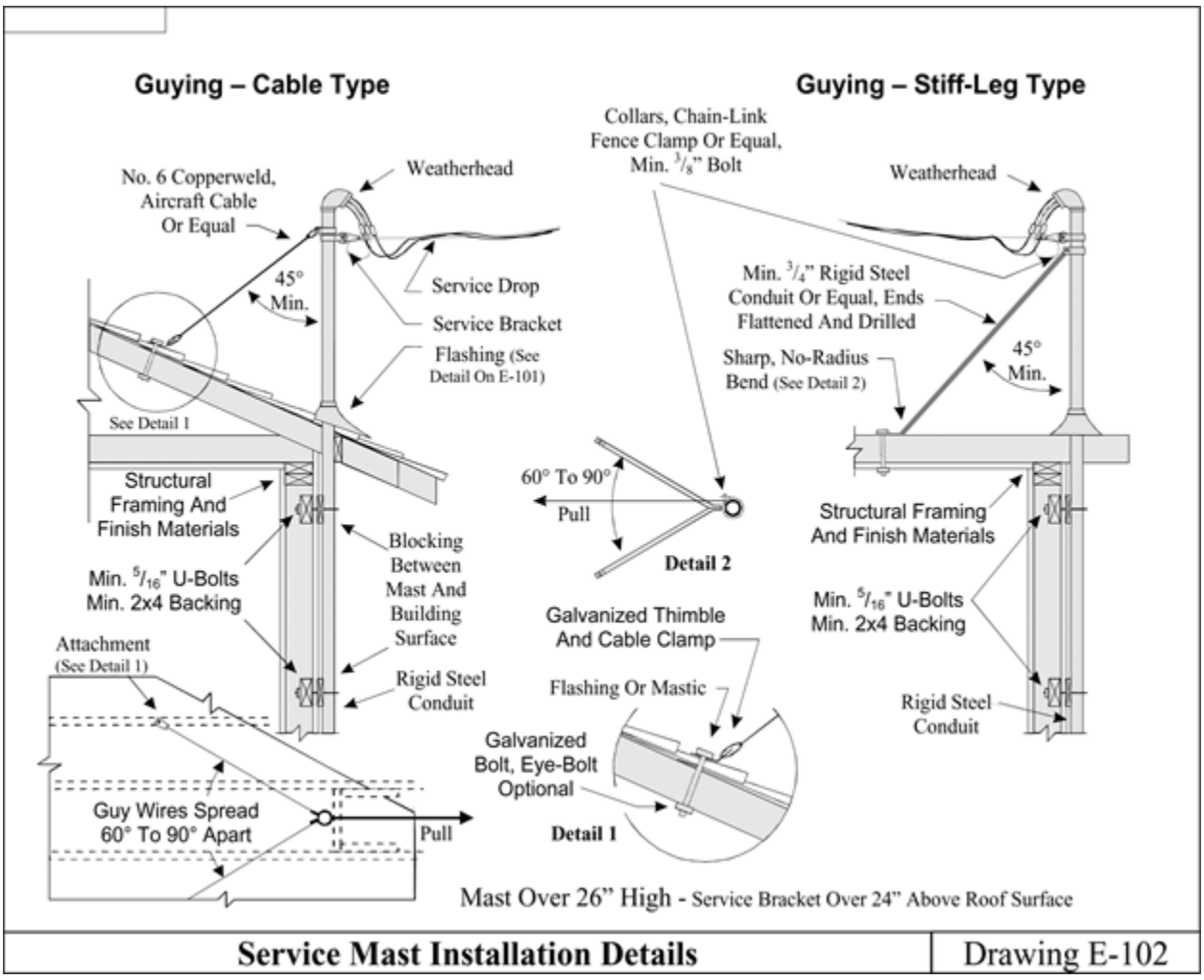
Informational Note: The serving utility shall be consulted for bracket and guy wire requirements.

(7) Have openings protected by approved neoprene or lead flashing to create a watertight seal where service conduit passes through the roof.

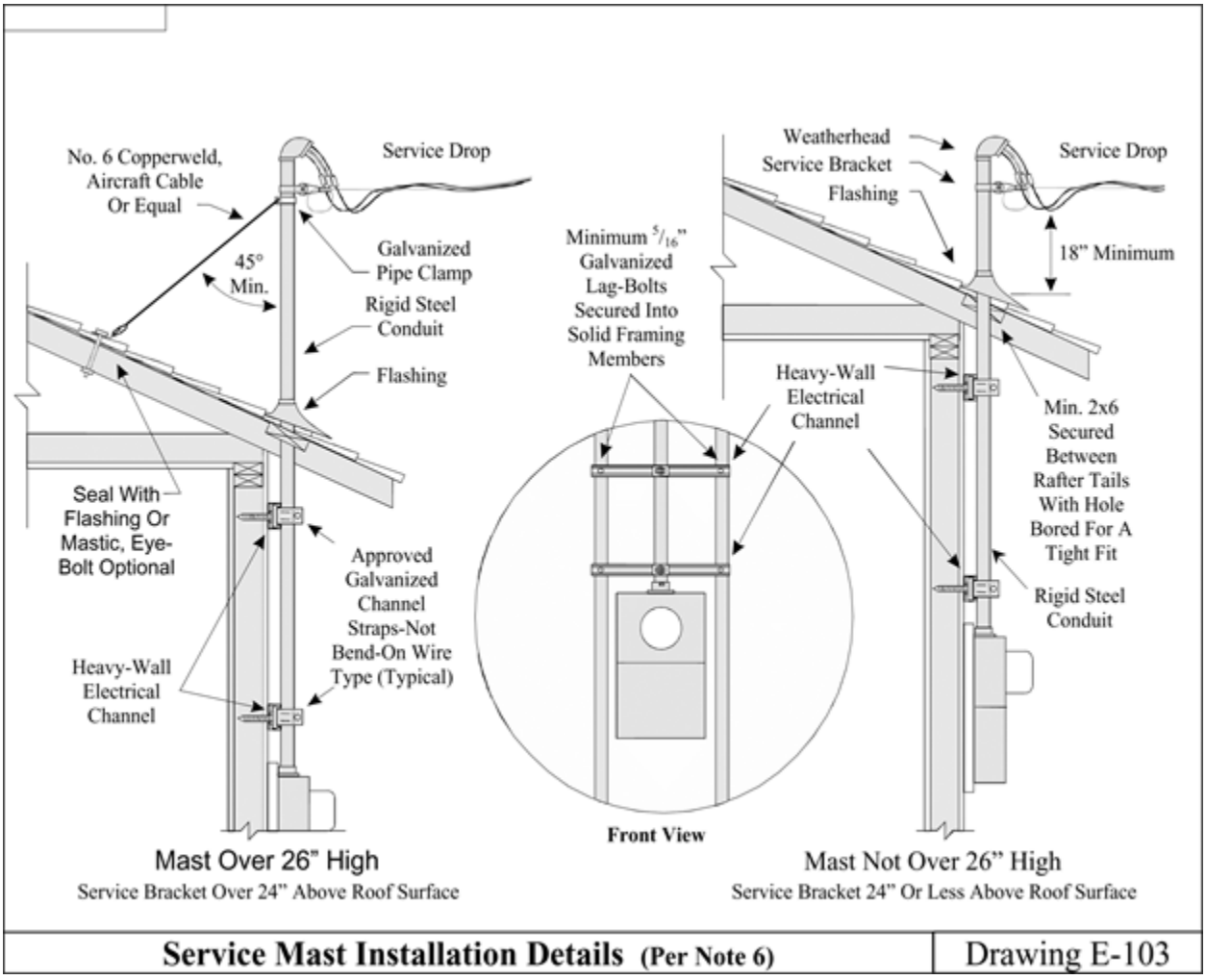
(8) Locate couplings only below the roofline and below a point of support for the mast.

Informational Note: WAC 296-46B-230.028, requirements for service mast installations, is incorporated herein.





Service Mast Installation Details | Drawing E-102



Notes to drawings E-101, E-102, and E-103

(1) An approved roof flashing must be installed on each mast where it passes through a roof. Plastic, nonhardening mastic must be placed between lead-type flashings and the conduit. Neoprene type flashings will also be permitted to be used.

(2) Masts must be braced, secured, and supported in such a manner that no pressure from the attached conductors will be exerted on a roof flashing, meter base, or other enclosures.

(3) Utilization of couplings for a mast is permitted only below the point the mast is braced, secured, or supported. There must be a minimum of two means of support above any couplings used. A properly installed cable or stiff leg type support qualifies as one of the two required means of support.

(4) Except as otherwise required by the serving utility, service mast support guys must be installed if the service drop attaches to the mast more than 24 inches above the roof line or if the service drop is greater than 100 feet in length from the pole or support. Masts for support of other than service drops must comply with this requirement as well.

(5) Intermediate support masts must be installed in an approved manner with methods identical or equal to those required for service masts.

(6) For altered services, where it is impractical to install U bolt mast supports due to interior walls remaining closed, it will be permissible to use other alternate mast support methods such as heavy gauge, galvanized, electrical channel material that is secured to two or more wooden studs with 5/16 inch diameter or larger galvanized lag bolts.

(7) Conductors must extend at least 18 inches from all mastheads to permit connection to the connecting overhead wiring.

230.29 Supports over Buildings <u>and Wires on or about Buildings or Structures over Water</u>. ((~~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.~~))

Supports for service entrance conductors and service entrance conduit containing wires on or about buildings or structures over water shall comply with the following:

(1) 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.

(2) 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.
(3) 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.

(4) 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.
(5) 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.

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*

Δ **(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) RMC conduit

(2) IMC conduit

(3) Type NUCC conduit

(4) HDPE conduit

(5) PVC conduit

(6) 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) Type MI cable, where suitably protected against physical damage and corrosive conditions

(((~~(11) Type TC-ER cable where identified for service entrance use and direct burial applications~~))

230.40 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.

Informational Note: See SEC 230.4 for additional information about service-entrance conductor sets serving development sites.

Exception No. 1: A building with more than one occupancy shall be permitted to have one set of service-entrance conductors for each service, as permitted in 230.2, run to each occupancy or group of occupancies. If the number of service disconnect locations for any given classification of service does not exceed six, the requirements of 230.2(E) shall apply at each location. If the number of service disconnect locations exceeds six for any given supply classification, the following conditions shall apply:

(1) All service disconnect locations for all supply characteristics, together with any branch circuit or feeder supply sources, shall be clearly described using graphics or text, or both, on one or more plaques

(2) The plaques shall be 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: 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: 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: One set of service-entrance conductors connected to the supply side of the normal service disconnecting means shall be permitted to supply each or several systems covered by 230.82(5) or 230.82(6).

(B) Two-family and multiple-occupancy buildings. A second or additional service drop or lateral to a building having more than one occupancy will be permitted to be installed at a location separate from other service drops or laterals to the building, provided that all the following conditions are complied with:

(1) Each service drop or lateral must be sized in accordance with the NEC for the calculated load to be served by the conductors;

(2) Each service drop or lateral must terminate in listed metering or service equipment;

(3) Each occupant must have access to the occupant's service disconnecting means;

(4) No more than 6 service disconnects may be supplied from a single transformer;

(5) All service drops or laterals supplying a building must originate at the same transformer or power supply;

(6) A permanent identification plate must be placed at each service disconnect location that identifies all other service disconnect locations in or on the building, the area or units served by each, the total number of service disconnecting means on the building or structure and the area or units served. If a structure consists of multiple buildings (i.e., by virtue of fire separation), all service disconnects in or on the entire structure must be labeled to identify all service disconnects in or on the structure; and

(7) A permanent identification plate must be placed at each feeder disconnecting means identifying the area or units served if the feeder disconnecting means is remote from the area or unit served.

Informational Note: WAC 296-46B-230.040(5), requirements for second or additional service conductors, is incorporated herein with edits.

230.42 Minimum Size and Ampacity.

Δ **(A) General.** Service-entrance conductors shall have an ampacity of not less than the maximum load to be served. Conductors shall be sized not less than the largest of 230.42(A)(1) or (A)(2). Loads shall be determined in accordance with Part III, IV, or V of Article 220, as applicable. Ampacity shall be determined from 310.14 and shall comply with 110.14(C). The maximum current of busways shall be that value for which the busway has been listed or labeled.

Informational Note: See UL 857, Standard for Safety for Busways, for information on busways.

N **(1) Continuous and Noncontinuous Loads.** Where the service-entrance conductors supply continuous loads or any combination of noncontinuous and continuous loads, the minimum service-entrance conductor size shall have an ampacity not less than the sum of the noncontinuous loads plus 125 percent of continuous loads.

Exception No. 1: Grounded conductors that are not connected to an overcurrent device shall be permitted to be sized at 100 percent of the sum of the continuous and noncontinuous load.

Exception No. 2: The sum of the noncontinuous load and the continuous load if the service-entrance conductors terminate in an overcurrent device where both the overcurrent device and its assembly are listed for operation at 100 percent of their rating shall be permitted.

N **(2) Application of Adjustment or Correction Factors.** 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(D).

(D) Ungrounded Conductors. If the service conductors have a lesser ampacity than the rating of service equipment with multiple service disconnects permitted by Sections 230.90 or 310.15, or the equipment rating that they terminate in or on, an identification plate showing the ampacity of the conductors must be installed on the service equipment.

Informational Note: WAC 296-46B-230.042(6), requirement for labeling of service equipment, is incorporated herein with edits.

230.43 Wiring Methods for 1000 Volts, Nominal, or Less.
Service-entrance conductors shall be installed in accordance with the applicable requirements of this Code covering the type of wiring method used and shall be limited to the following methods:
(1) ((~~Open wiring on insulators~~)) Reserved

(2) ((~~Type IGS cable~~)) Reserved

(3) Rigid metal conduit (RMC)

(4) Intermediate metal conduit (IMC)

(5) ((~~Electrical metallic tubing (EMT)~~)) Reserved

(6) ((~~Electrical nonmetallic tubing~~)) Reserved

(7) ((~~Service-entrance cables~~)) Reserved

(8) ((~~Wireways~~)) Reserved

(9) Busways

(10) ((~~Auxiliary gutters~~)) Reserved

(11) Rigid polyvinyl chloride conduit (PVC)

(12) Cablebus

(13) ((~~Type MC cable~~)) Reserved

(14) Mineral-insulated, metal-sheathed cable, Type MI

(15) ((~~Flexible metal conduit (FMC) not over 1.8 m (6 ft) long or liquidtight flexible metal conduit (LFMC) not over 1.8 m (6 ft) long between a raceway, or between a raceway and service equipment, with a supply-side bonding jumper routed with the flexible metal conduit (FMC) or the liquidtight flexible metal conduit (LFMC) according to 250.102(A), (B), (C), and (E)~~)) Reserved

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

(17) High density polyethylene conduit (HDPE)

(18) Nonmetallic underground conduit with conductors (NUCC)

(19) Reinforced thermosetting resin conduit (RTRC)

(((~~(20) Type TC-ER cable where identified for use as service entrance conductors~~))

(((~~(21) Flexible bus systems~~))

Exception: Wiring methods per NEC 230.43 shall be permitted for service conductors within a building or structure when those conductors are protected by customer owned supply side overcurrent protection sized per NEC 240.4. Existing electrical metallic tubing, installed prior to October 1984, which is properly grounded and used for service entrance conductors may be permitted to remain if the conduit is installed in a nonaccessible location and is the proper size for the installed conductors.

Informational note: The requirements of WAC 296-46B-230 043 (7 & 8) are incorporated herein with edits

230.44 Cable Trays.

Cable tray systems ((~~shall~~)) may with prior approval of the authority having jurisdiction, be permitted to support service-entrance conductors. Cable trays used to support service-entrance conductors shall contain only service-entrance conductors and shall be limited to the following methods:
(1) ((~~Type SE cable~~))

(2) ((~~Type MC cable~~))

(3) Type MI cable

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

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

~~(6) Type TC-ER cable~~))

Such cable trays shall be identified with permanently affixed labels with the wording "Service-Entrance Conductors." The labels shall be located so as to be visible after installation with a spacing not to exceed 3 m (10 ft) so that the service-entrance conductors are able to be readily traced through the entire length of the cable tray.

Exception: Conductors, other than service-entrance conductors, shall be permitted to be installed in a cable tray with service entrance conductors, provided a solid fixed barrier identified for use with the cable tray is installed to separate the service-entrance conductors from other conductors installed in the cable tray.

230.46 Spliced and Tapped Conductors.
Service-entrance conductors shall be permitted to be spliced or tapped in accordance with 110.14, 300.5(E), 300.13, and 300.15 only by special permission of the authority having jurisdiction. Power distribution blocks, pressure connectors, and devices for splices and taps shall be listed. Power distribution blocks installed on service conductors shall be marked "suitable for use on the line side of the service equipment" or equivalent.

Pressure connectors and devices for splices and taps installed on service conductors shall be marked "suitable for use on the line side of the service equipment" or equivalent.

230.50 Protection Against Physical Damage.

(A) Underground Service-Entrance Conductors. Underground service-entrance conductors shall be protected against physical damage in accordance with 300.5.

(B) All Other Service-Entrance Conductors. All other service entrance conductors, other than underground service entrance conductors, shall be protected against physical damage ((~~as specified in 230.50(B)(1) or (B)(2).~~

~~**(1) Service-Entrance Cables.** Service-entrance cables, where subject to physical damage, shall be protected by any of the following:~~

~~(1) Rigid metal conduit (RMC)~~

~~(2) Intermediate metal conduit (IMC)~~

~~(3) Schedule 80 PVC conduit~~

~~(4) Electrical metallic tubing (EMT)~~

~~(5) Reinforced thermosetting resin conduit (RTRC)~~

~~(6) Other approved means~~

~~**(2) Other Than Service-Entrance Cables.** Individual open conductors and cables, other than service-entrance cables, shall not be installed within 3.0 m (10 ft) of grade level or where exposed to physical damage.~~

~~*Exception: Type MI and Type MC cable shall be permitted within 3.0 m (10 ft) of grade level where not exposed to physical damage or where protected in accordance with 300.5(D).))*~~

230.51 ((~~Mounting Supports.~~ ~~Service-entrance cables or individual open service-entrance conductors shall be supported as specified in 230.51(A), (B), or (C).~~

~~**(A) Service-Entrance Cables.** Service-entrance cables shall be supported by straps or other approved means within 300 mm (12 in.) of every service head, gooseneck, or connection to a raceway or enclosure and at intervals not exceeding 750 mm (30 in.).~~

~~**(B) Other Cables.** Cables that are not approved for mounting in contact with a building or other structure shall be mounted on insulating supports installed at intervals not exceeding 4.5 m (15 ft) and in a manner that maintains a clearance of not less than 50 mm (2 in.) from the surface over which they pass.~~

~~**(C) Individual Open Conductors.** Individual open conductors shall be installed in accordance with Table 230.51(C). Where exposed to the weather, the conductors shall be mounted on insulators or on insulating supports attached to racks, brackets, or other approved means. Where not exposed to the weather, the conductors shall be mounted on glass or porcelain knobs.~~)) Not adopted.

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.~~)) Not adopted.

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.

230.70 General.
Means shall be provided to disconnect all ungrounded conductors in a building or other structure from the service conductors.

(A) Location. The service disconnecting means shall be installed in accordance with 230.70(A)(1), (A)(2), and (A)(3).

(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 Locations. Service disconnecting means shall not be installed in bathrooms, toilet rooms, shower rooms, clothes closets, cupboards, attics, under or over stairways, within any stairway enclosure, nor above washers, water heaters, sinks, plumbing fixtures, drain boards, ranges or 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) 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.

Δ **(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 hazardous location requirements.

Δ 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) Existing installations of cable limiters by special permission of the authority having jurisdiction.

(2) Meters and meter sockets nominally rated not in excess of 1000 volts, if all metal housings and service enclosures are grounded in accordance with Part VII and bonded in accordance with Part V of Article 250. Taps under meter socket lugs shall not be permitted, except by prior approval from the authority having jurisdiction.

(3) Meter disconnect switches nominally rated not in excess of 1000 volts that have a short-circuit current rating equal to or greater than the available fault current, if all metal housings and service enclosures are grounded in accordance with Part VII and bonded in accordance with Part V of Article 250. A meter disconnect switch shall be capable of interrupting the load served. A meter disconnect shall be legibly field marked on its exterior in a manner suitable for the environment as follows:

METER DISCONNECT
NOT SERVICE EQUIPMENT

(4) Instrument transformers (current and voltage), impedance shunts, load management devices, surge arresters, and Type 1 surge-protective devices.

(5) Conductors used to supply energy management systems, circuits for standby power systems, fire pump equipment, and fire and sprinkler alarms, if provided with service equipment and installed in accordance with requirements for service-entrance conductors.

(6) Solar photovoltaic systems, fuel cell systems, wind electric systems, energy storage systems, or interconnected electric power production sources, if provided with a disconnecting means listed as suitable for use as service equipment, and overcurrent protection as specified in Part VII of Article 230.

(7) Control circuits for power-operable service disconnecting means, if suitable overcurrent protection and disconnecting means are provided.

(8) Ground-fault protection systems or Type 2 surge-protective devices, where installed as part of listed equipment, if suitable overcurrent protection and disconnecting means are provided.

(9) Connections used only to supply listed communications equipment under the exclusive control of the serving electric utility, if suitable overcurrent protection and disconnecting means are provided. For installations of equipment by the serving electric utility, a disconnecting means is not required if the supply is installed as part of a meter socket, such that access can only be gained with the meter removed.

(10) Emergency disconnects in accordance with 230.85(B)(2) and (B)(3), if all metal housings and enclosures are grounded in accordance with Part VII and bonded in accordance with Part V of Article 250.

(11) Meter-mounted transfer switches nominally rated not in excess of 1000 volts that have a short-circuit current rating equal to or greater than the available fault current. A meter-mounted transfer switch shall be listed and be capable of transferring the load served. A meter-mounted transfer switch shall be marked on its exterior with both of the following:

a. Meter-mounted transfer switch

b. Not service equipment

(12) Control power circuits for protective relays where installed as part of listed equipment, if overcurrent protection and disconnecting means are provided.

(13) 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.

(14) Listed service accessory bus gutters or termination boxes that are approved for use on the line side of service equipment. Junction and pull boxes are not permitted except as allowed in (6) of this section.

Δ 230.85 Emergency Disconnects.
For one- and two-family dwelling units, an emergency disconnecting means shall be installed.

N **(A) General.**

(1) Location. The disconnecting means shall be installed in a readily accessible outdoor location on or within sight of the dwelling unit.

Exception: Where the requirements of 225.41 are met, this section shall not apply.

(2) Rating. The disconnecting means shall have a short-circuit current rating equal to or greater than the available fault current.

(3) Grouping. If more than one disconnecting means is provided, they shall be grouped.

N **(B) Disconnects.** Each disconnect shall be one of the following:

(1) Service disconnect

(2) A meter disconnect integral to the meter mounting equipment not marked as suitable only for use as service equipment installed in accordance with 230.82

(3) Other listed disconnect switch or circuit breaker that is marked suitable for use as service equipment, but not marked as suitable only for use as service equipment, installed on the supply side of each service disconnect

Informational Note 1: Conductors between the emergency disconnect and the service disconnect in 230.85(2) and 230.85(3) are service conductors.

Informational Note 2: Equipment marked “Suitable only for use as service equipment” includes the factory marking “Service Disconnect”.

N **(C) Replacement.** Where existing service equipment is replaced, all of the requirements of this section shall apply only if the service ampacity is increased or decreased, or when any one of the following are relocated: service disconnects, meter bases, overhead service masts, or underground service risers.

~~*((Exception: Where only meter sockets, service entrance conductors, or related raceways and fittings are replaced, the requirements of this section shall not apply.))*~~

Informational note: The requirements and exceptions of WAC 296-46B-230 085 are incorporated herein with edits.

N **(D) Identification of Other Isolation Disconnects.**
Where equipment for isolation of other energy source systems is not located adjacent to the emergency disconnect required by this section, a plaque or directory identifying the location of all equipment for isolation of other energy sources shall be located adjacent to the disconnecting means required by this section.

Informational Note: See 445.18, 480.7, 705.20, and 706.15 for examples of other energy source system isolation means.

N **(E) Marking.**

N **(1) Marking Text.** The disconnecting means shall be marked as follows:

(1) Service disconnect

EMERGENCY DISCONNECT, SERVICE DISCONNECT

(2) Meter disconnects installed in accordance with 230.82(3) and marked as follows:

EMERGENCY DISCONNECT, METER DISCONNECT,
NOT SERVICE EQUIPMENT

(3) Other listed disconnect switches or circuit breakers on the supply side of each service disconnect that are marked suitable for use as service equipment and marked as follows:

EMERGENCY DISCONNECT,
NOT SERVICE EQUIPMENT

N **(2) Marking Location and Size.** Markings shall comply with 110.21(B) and both of the following:

(1) The marking or labels shall be located on the outside front of the disconnect enclosure with red background and white text.
(2) The letters shall be at least 13 mm (1⁄2 in.) high.

230.90 Where Required.

Each ungrounded service conductor shall have overload protection. If the service conductors have a lesser ampacity than the rating of service equipment with multiple service disconnects permitted by Sections 230.90 or 310.15 of this Code, an identification plate showing the ampacity of the conductors must be installed on the service equipment.

Informational Note: WAC 296-46B-230.042(6), requirements for service conductor size and rating, is incorporated herein with edits.

Δ **(A) Ungrounded Conductor.** Such protection shall be provided by an overcurrent device in series with each ungrounded service conductor that has a rating or setting not higher than the ampacity of the conductor. A set of fuses shall be considered all the fuses required to protect all the ungrounded conductors of a circuit. Single-pole circuit breakers, grouped in accordance with 230.71(B), shall be considered as one protective device.

Exception No. 1: For motor-starting currents, ratings that comply with 430.52, 430.62, and 430.63 shall be permitted.

Exception No. 2: Fuses and circuit breakers with a rating or setting that complies with 240.4(B) or (C) and 240.6 shall be permitted.

Exception No. 3: Two to six circuit breakers or sets of fuses shall be permitted as the overcurrent device to provide the overload protection. The sum of the ratings of the circuit breakers or fuses shall be permitted to exceed the ampacity of the service conductors, provided the calculated load does not exceed the ampacity of the service conductors.

Exception No. 4: Overload protection for fire pump supply conductors shall comply with 695.4(B)(2)(a).

Exception No. 5: Overload protection in accordance with the conductor ampacities of 310.12 shall be permitted for single-phase dwelling services.

(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 1000 volts phase-to-phase for each service disconnect rated 1000 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 1200 amperes, and the maximum time delay shall be one second for ground-fault currents equal to or greater than 3000 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 could make it necessary to review the overall wiring system for proper selective overcurrent protection coordination. Additional installations of ground-fault protective equipment might 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 could 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.

Informational Note No. 5: The requirements of WAC 256-46B-230 095 are incorporated herein with edits

ARTICLE 235
Branch Circuits, Feeders, and Services Over 1000 Volts ac, 1500 Volts dc, Nominal

N **235.402 Service-Entrance Conductors.**
Service-entrance conductors to buildings or enclosures shall be installed to conform to 235.402(A) and (B).

N **(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.

N **(B) Wiring Methods.** Service-entrance conductors shall be installed by one of the following wiring methods ((~~covered in 305.3 and 305.15.~~)):

(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.

Informational Note No. 2: WAC 296-46B-235 402 requirements are incorporated herein.

ARTICLE 240
Overcurrent Protection

240.24 Location in or on Premises.

(A) Accessibility. ((~~Circuit breakers and switches containing fuses~~)) Equipment containing overcurrent devices shall be readily accessible and installed so that the center of the grip of the operating handle of the switch or circuit breaker, when in its highest position, is not more than 2.0 m (6 ft 7 in.) above the floor or working platform, unless one of the following applies:

(1) For busways, as provided in 368.17(C).

(2) For supplementary overcurrent protection, as described in 240.10.

(3) For overcurrent protective devices, as described in 225.40 and 230.92.

(4) For overcurrent protective devices adjacent to utilization equipment that they supply, access shall be permitted to be by portable means.

Exception: The use of a tool shall be permitted to access overcurrent protective devices located within listed industrial control panels, within enclosures designed for hazardous (classified) locations or enclosures to protect against environmental conditions. An enclosure within the scope of this exception, and all overcurrent protective device(s) within such enclosures as judged with the enclosure open, shall comply with the accessibility provisions of 240.24(A).

(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 Protective 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 protective devices and feeder overcurrent protective 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 Protective 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 protective devices supplying any guest rooms, guest suites, or sleeping rooms in dormitory units without permanent provisions for cooking shall be permitted to be accessible only to authorized management personnel.

(3) Dwelling Units, 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 protective devices shall be located where they will not be exposed to physical damage.

(1) Exterior installations: Where this code and/or manufacturer's instructions do not specify minimum height requirements for equipment enclosures, enclosures containing an overcurrent protective device installed outdoors shall be installed so the bottom of the enclosure is not less than 24 inches above finished grade unless:

(1) The equipment enclosure or listed equipment on which the enclosure is mounted is approved for pad-, floor-, ground-, dock-, or pier-mounting; or-
(2) The equipment enclosure is located over concrete or asphalt paving that extends three or more feet horizontally from the surface of the enclosure.

Informational Note No. 1: See 110.11 for information on deteriorating agents that could cause physical damage.

Informational Note No. 2: The requirements of WAC 296-46B-240 024(C) are incorporated herein with edits.

(D) Not in Vicinity of Easily Ignitible Material. Overcurrent protective devices shall not be located in the vicinity of easily ignitible material, such as in clothes closets.

(E) Not Located in Bathrooms. Overcurrent protective devices, other than supplementary overcurrent protection, shall not be located in bathrooms, showering facilities, or locker rooms with showering facilities.

(F) Not Located over Steps. Overcurrent protective devices shall not be located over steps of a stairway.

Exception: If the overcurrent protective device is a part of a panelboard that is being repaired or replaced in an existing location that was approved at the time of installation, the installation shall be allowed over steps.

Informational Note: The exception of WAC 296-46B-240 024(F) is incorporated herein with edits.

Δ 240.33 Vertical Position.

Enclosures for overcurrent devices shall be mounted in a vertical position. Circuit breaker enclosures shall be permitted to be installed horizontally where the circuit breaker is installed in accordance with 240.81. Listed busway plug-in units shall be permitted to be mounted in orientations corresponding to the busway mounting position, when in accordance with 240.81 and 404.7.

ARTICLE 250
Grounding and Bonding

250.50 Grounding Electrode System.
All grounding electrodes as described in 250.52(A)(1) through (A)(7) that are present at each building or structure served shall be bonded together to form the grounding electrode system. If none of these grounding electrodes exist, one or more of the grounding electrodes specified in 250.52(A)(4) through (A)(8) shall be installed and used.

Except for mobile/manufactured homes, a concrete encased grounding electrode must be installed and used at each new building or structure that is built upon a permanent concrete foundation. The electrode must comply, with NEC 250.52 (A)(3).

Exception No. 1: Concrete-encased electrodes of existing buildings or structures shall not be required to be part of the grounding electrode system if the rebar is not accessible for use without disturbing the concrete. Where a concrete encased electrode is not part of the grounding electrode system of an existing building or structure, a concrete encased electrode that may be available as a result of a new addition to the foundation is not required to be connected to service equipment that existed before the addition.

Exception No.2: If the concrete encased grounding electrode is not available for connection, a ground ring or other grounding electrode shall be installed per NEC 250 and verified to measure 25 ohms or less to ground by the inspector. If the concrete encased grounding electrode has not been inspected and approved, but is available for connection, the electrode(s) shall be verified to measure 25 ohms or less to ground by the inspector. A ground resistance test fee shall apply.

Informational note: The requirements and exceptions of WAC 296-46B-250 052 are incorporated herein with edits.

250.53 Grounding Electrode System Installation.

(A) Rod, Pipe, and Plate Electrodes. Rod, pipe, and plate electrodes shall be free from nonconductive coatings such as paint or enamel. Rod, pipe, and plate electrodes shall meet the requirements of 250.53(A)(1) through (A)(3).

Δ **(1) Below Permanent Moisture Level.** If practicable, rod, pipe, and plate electrodes shall be embedded below permanent moisture level.

(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.~~))A supplemental electrode shall not be required for a temporary service, a utility pole mounted service, or where only one of the following service components is replaced:
(1) Overhead service mast

(2) Meter base enclosure

(3) Service disconnect and/or emergency disconnect

(3) Supplemental Electrode. If multiple rod, pipe, or plate electrodes are installed to meet the requirements of this section, they shall not be less than ((~~1.8 m (6 ft)~~)) 2.5 m (8 ft) apart.

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

(4) Rod and Pipe Electrodes. The electrode shall be installed such that at least 2.44 m (8 ft) of length is in contact with the soil. It shall be driven to a depth of not less than 2.44 m (8 ft) except that, where rock bottom is encountered, the electrode shall be driven at an oblique angle not to exceed 45 degrees from the vertical or, where rock bottom is encountered at an angle up to 45 degrees, the electrode shall be permitted to be buried in a trench that is at least 750 mm (30 in.) deep. The upper end of the electrode shall be flush with or below ground level unless the aboveground end and the grounding electrode conductor attachment are protected against physical damage as specified in 250.10.

(5) Plate Electrode. Plate electrodes shall be installed not less than 750 mm (30 in.) below the surface of the earth.

Δ **(B) Electrode Spacing.** If 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.

(C) Bonding Jumper. The bonding jumper(s) used to connect the grounding electrodes together to form the grounding electrode system shall be installed in accordance with 250.64(A), (B), and (E), shall be sized in accordance with 250.66, and shall be connected in the manner specified in 250.70. Rebar shall not be used as a conductor to interconnect the electrodes of grounding electrode systems.

(D) Metal Underground Water Pipe. If used as a grounding electrode, metal underground water pipe shall meet the requirements of 250.53(D)(1) and (D)(2).

(1) Continuity. Continuity of the grounding path or the bonding connection to interior piping shall not rely on water meters or filtering devices and similar equipment.

(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 as specified in 250.68(C)(1).

(E) Supplemental Grounding Electrode Bonding Jumper Size. If 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 or copper-clad aluminum wire.

(F) Ground Ring. The ground ring shall be installed not less than 750 mm (30 in.) below the surface of the earth.

250.64 Grounding Electrode Conductor Installation.
Grounding electrode conductors at the service, at each building or structure where supplied by a feeder(s) or branch circuit(s), or at a separately derived system shall be installed as specified in 250.64(A) through (G).

(A) Aluminum or Copper-Clad Aluminum Conductors. Grounding electrode conductors of bare, covered, or insulated aluminum or copper-clad aluminum shall comply with the following:

(1) Bare or covered conductors without an extruded polymeric covering shall not be installed where subject to corrosive conditions or be installed in direct contact with concrete.

(2) Terminations made within outdoor enclosures that are listed and identified for the environment shall be permitted within 450 mm (18 in.) of the bottom of the enclosure.

(3) Aluminum or copper-clad aluminum conductors external to buildings or equipment enclosures shall not be terminated within 450 mm (18 in.) of the earth.

(B) Securing and Protection Against Physical Damage. If 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, copper-clad aluminum, 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, copper-clad aluminum, or aluminum grounding electrode conductor exposed to physical damage shall be protected.((~~in rigid metal conduit (RMC), intermediate metal conduit (IMC), ((Schedule 80)) rigid polyvinyl chloride conduit (PVC), reinforced thermosetting resin conduit Type XW (RTRC-XW), electrical metallic tubing (EMT), or cable armor.~~)) Grounding electrode conductors exposed to theft shall be considered exposed to physical damage. Grounding electrode conductors will be considered protected from physical damage when the conductor(s) are:

(1) Buried more than 12 inches deep in the earth outside the building's footprint;

(2) Encased or covered by 2 inches of concrete or asphalt;

(3) 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

(4) 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-250 064(5) has been incorporated into this section.

(3) **Smaller Than 6 AWG.** Grounding electrode conductors smaller than 6 AWG shall be protected in RMC, IMC, Schedule 80 PVC, RTRC-XW, EMT, or cable armor.

(4) **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 or 305.15, but shall be buried or otherwise protected if subject to physical damage.

Informational Note: WAC 296-46B-250 064(5) has been incorporated into this section.

(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 the following:

(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), (D)(2), or (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 a 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).

The termination point of a grounding electrode conductor tap to the grounding electrode conductor must be accessible unless the connection is made using an exothermic or irreversible compression connection.

Informational Note: The requirements of WAC 296-46B-250 064(6) have been incorporated herein.

(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(s) or branch circuit(s) for other than services

(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, Cable Armor, and Enclosures for Grounding Electrode Conductors.

(1) General. Ferrous metal raceways, enclosures, and cable armor for grounding electrode conductors shall be electrically continuous from the point of attachment to cabinets or equipment to the grounding electrode and shall be securely fastened to the ground clamp or fitting. Ferrous metal raceways, enclosures, and cable armor shall be bonded at each end of the raceway or enclosure to the grounding electrode or grounding electrode conductor to create an electrically parallel path. Nonferrous metal raceways, enclosures, and cable armor shall not be required to be electrically continuous.
(2) Methods. Bonding shall be in compliance with 250.92(B) and ensured by one of the methods in 250.92(B)(2) through (B)(4).
(3) Size. The bonding jumper for a grounding electrode conductor(s), raceway(s), enclosure(s), or cable armor shall be the same size as, or larger than, the largest enclosed grounding electrode conductor.
(4) Wiring Methods. If a raceway is used as protection for a grounding electrode conductor, the installation shall comply with the requirements of the applicable raceway article.

(F) Installation to Electrode(s). Grounding electrode conductor(s) and bonding jumpers interconnecting grounding electrodes shall be installed in accordance with one of the following. The grounding electrode conductor shall be sized for the largest grounding electrodes shall be installed in accordance with one of the following. 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).

N **(G) Enclosures with Ventilation Openings.** Grounding electrode conductors shall not be installed through a ventilation opening of an enclosure.

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 the following shall be bonded together:

(1) All raceways, including utility raceways that are electrically continuous to service equipment; cable trays((,)); cablebus framework; auxiliary gutters((,)); or service cable armor or sheath; 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

Δ **(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 or more of the following methods:

(1) Bonding equipment to the grounded service conductor by an applicable method in 250.8(A). Connection to the grounded service conductor shall not be used to bond current transformer enclosures under jurisdiction of the utility.

Informational Note: This requirement originates from *Requirements for Electric Service Connection*, chapter 6, published by Seattle City Light, and is incorporated herein.

(2) Connections made up wrenchtight using threaded couplings, threaded entries, or listed threaded hubs on enclosures
(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 250.104(A)(1), (A)(2), or (A)(3).

(1) General. Metal water piping system(s) installed in or attached to a building or structure shall be bonded to any of the following:

(1) Service equipment enclosure

(2) Grounded conductor at the service

(3) Grounding electrode conductor, if of sufficient size

(4) One or more grounding electrodes used, if the grounding electrode conductor or bonding jumper to the grounding electrode is of sufficient size

The bonding jumper(s) shall be installed in accordance with 250.64(A), (B), and (E). The points of attachment of the bonding jumper(s) shall be accessible. The bonding jumper(s) shall be sized in accordance with Table 250.102(C)(1) except that it shall not be required to be larger than 3/0 copper or 250 kcmil aluminum or copper-clad aluminum and except as permitted in 250.104(A)(2) and (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) 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 250.102(D). The bonding jumper shall not be required to be larger than the largest ungrounded feeder or branch-circuit conductor supplying the building or structure.

Informational Note: See 250.90 exception #1 for bonding of metallic stubs and valves used in non-metallic plumbing systems and 250.90 exception #2 for bonding of hot water lines.

(B) Flexible Metal Natural Gas Piping. Bonding of flexible metal natural gas piping installations, installed new or extended from an existing rigid metal piping system, shall comply with either 250.104(B)(1) or (2):

(1) Installed per manufacturer's instructions. A copy of the manufacturer's instructions shall be provided to the inspector at time of inspection.

(2) Bonded with a minimum 6 AWG copper conductor and terminate at an accessible location on rigid iron piping downstream of the gas utility meter. The bonding conductor shall connect the gas piping system to the service equipment enclosure, grounding electrode or grounding electrode conductor, or grounded conductor termination bussing or bar in the service equipment enclosure.

Informational note: The requirements of WAC 296-46B-250 104(B)(9) are incorporated herein with edits.

Δ **((~~B~~))** **(C)** **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.

Informational Note No. 1: Bonding all piping and metal air ducts within the premises will provide additional safety.

Informational Note No. 2: See NFPA 54, National Fuel Gas Code, and NFPA 780, Standard for the Installation of Lightning Protection Systems, for information on gas piping systems.

(((~~C~~))) (D) Structural Metal. Exposed structural metal that is interconnected to form a metal building frame, is not intentionally grounded or bonded, and is likely to become energized shall be bonded to any of the following:

(1) Service equipment enclosure

(2) Grounded conductor at the service

(3) Disconnecting means for buildings or structures supplied by a feeder or branch circuit

(4) Grounding electrode conductor, if not smaller than a conductor sized in accordance with Table 250.102(C)(1)

(5) One or more grounding electrodes used, if the grounding electrode conductor or bonding jumper to the grounding electrode is not smaller than a conductor sized in accordance with Table 250.102(C)(1)

The bonding conductor(s) or jumper(s) shall be sized in accordance with Table 250.102(C)(1), except that it shall not be required to be larger than 3/0 AWG copper or 250 kcmil aluminum or copper-clad aluminum, and installed in accordance with 250.64(A), (B), and (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~~))) (E) 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 (D)(3).

(1) Metal Water Piping System(s). The grounded conductor of each separately derived system shall be bonded to the nearest accessible point of the metal water piping system(s) in the area served by each separately derived system. This connection shall be made at the same point on the separately derived system where the grounding electrode conductor is connected. Each bonding jumper shall be sized in accordance with Table 250.102(C)(1) based on the largest ungrounded conductor of the separately derived system except that it shall not be required to be larger than 3/0 AWG copper or 250 kcmil aluminum or copper-clad aluminum.

Exception No. 1: A separate bonding jumper to the metal water piping system shall not be required if the metal water piping system is used as the grounding electrode or grounding electrode conductor for the separately derived system and the connection to the water piping system is in the area served by the separately derived system.

Exception No. 2: A separate bonding jumper to the metal water piping system shall not be required if the metal in-ground support structure is used as a grounding electrode or the metal frame of a building or structure is used as the grounding electrode conductor for a separately derived system and is bonded to the metal water piping system in the area served by the separately derived system.

(2) Structural Metal. If exposed structural metal that is interconnected to form the building frame exists in the area served by the separately derived system, it shall be bonded to the grounded conductor of each separately derived system. This connection shall be made at the same point on the separately derived system where the grounding electrode conductor is connected. Each bonding jumper shall be sized in accordance with Table 250.102(C)(1) based on the largest ungrounded conductor of the separately derived system except that it shall not be required to be larger than 3/0 AWG copper or 250 kcmil aluminum or copper-clad aluminum.

Exception No. 1: A separate bonding jumper to the building structural metal shall not be required if the metal in-ground support structure is used as a grounding electrode or the metal frame of a building or structure is used as the grounding electrode conductor 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 system of a building or structure is used as the grounding electrode or grounding electrode conductor 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 water piping exists in the area served by the separately derived system, the metal water 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.

(F) Water system requirements. It is unlawful to connect to or use any water main or water pipe belonging to Seattle Public Utilities distribution and transmission systems for electrical grounding purposes.

Δ **250.118 Types of Equipment Grounding Conductors.**
N **(A) Permitted.** Each equipment grounding conductor run with or enclosing the circuit conductors shall be one or more or a combination of the following:
(1) A copper, aluminum, or copper-clad aluminum conductor. This conductor shall be solid or stranded; insulated, covered, or bare; and in the form of a wire or a busbar of any shape.

(2) Rigid metal conduit.

(3) Intermediate metal conduit.

(4) Electrical metallic tubing except in wet locations.

(5) Listed flexible metal conduit meeting all the following conditions:

a. The conduit is terminated in listed fittings.

b. The circuit conductors contained in the conduit are protected by overcurrent devices rated at 20 amperes or less.

c. The size of the conduit does not exceed metric designator 35 (trade size 1¼).

d. The combined length of flexible metal conduit, flexible metallic tubing, and liquidtight flexible metal conduit in the same effective ground-fault current path does not exceed 1.8 m (6 ft).

e. If flexibility is necessary to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement after installation, a wire-type equipment grounding conductor or a bonding jumper in accordance with 250.102(E)(2) shall be installed.

f. If flexible metal conduit is constructed of stainless steel, a wire-type equipment grounding conductor or bonding jumper in accordance with 250.102(E)(2) shall be installed.

(6) Listed liquidtight flexible metal conduit meeting all the following conditions:

a. The conduit is terminated in listed fittings.

b. For metric designators 12 through 16 (trade sizes ⅜ through ½), the circuit conductors contained in the conduit are protected by overcurrent devices rated at 20 amperes or less.

c. For metric designators 21 through 35 (trade sizes ¾ through 1¼), the circuit conductors contained in the conduit are protected by overcurrent devices rated not more than 60 amperes and there is no flexible metal conduit, flexible metallic tubing, or liquidtight flexible metal conduit in metric designators 12 through 16 (trade sizes ⅜ through ½) in the effective ground-fault current path.

d. The combined length of flexible metal conduit, flexible metallic tubing, and liquidtight flexible metal conduit in the same effective ground-fault current path does not exceed 1.8 m (6 ft).

e. If flexibility is necessary to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement after installation, a wire-type equipment grounding conductor or a bonding jumper in accordance with 250.102(E)(2) shall be installed.

f. If liquidtight flexible metal conduit contains a stainless steel core, a wire-type equipment grounding conductor or a bonding jumper in accordance with 250.102(E)(2) shall be installed.

(7) Flexible metallic tubing if the tubing is terminated in listed fittings and meeting the following conditions:

a. The circuit conductors contained in the tubing are protected by overcurrent devices rated at 20 amperes or less.

b. The combined length of flexible metal conduit, flexible metallic tubing, and liquidtight flexible metal conduit in the same effective ground-fault current path does not exceed 1.8 m (6 ft).

(8) Armor of Type AC cable as provided in 320.108.

(9) The copper sheath of mineral-insulated, metal-sheathed cable Type MI.

(10) Type MC cable that provides an effective ground-fault current path in accordance with one or more of the following:

a. It contains an insulated or uninsulated equipment grounding conductor in compliance with 250.118(1).

b. The combined metallic sheath and uninsulated equipment grounding/bonding conductor of interlocked metal tape–type MC cable that is listed and identified as an equipment grounding conductor

c. The metallic sheath or the combined metallic sheath and equipment grounding conductors of the smooth or corrugated tube-type MC cable that is listed and identified as an equipment grounding conductor

(11) Cable trays as permitted in 392.10 and 392.60.

(12) Cablebus framework as permitted in 370.60(1).

(13) Other listed electrically continuous metal raceways and listed auxiliary gutters.

(14) Surface metal raceways listed for grounding.

250.184 Solidly Grounded Neutral Systems.
Solidly grounded neutral systems shall be permitted to be either single point grounded or multigrounded neutral.

(A) Neutral Conductor.

(1) Insulation Level. The minimum insulation level for neutral conductors of solidly grounded systems shall be 600 volts.

Exception No. 1: For multigrounded neutral systems as permitted in 250.184(C), bare copper conductors shall be permitted to be used for the neutral conductor of the following:

(1) Service-entrance conductors

(2) Service laterals or underground service conductors

(3) Direct-buried portions of feeders

Exception No. 2: Bare conductors shall be permitted for the neutral conductor of overhead portions installed outdoors.

Exception No. 3: The grounded neutral conductor shall be permitted to be a bare conductor if isolated from phase conductors and protected from physical damage.

Informational Note: See 225.4 for conductor covering where within 3.0 m (10 ft) of any building or other structure.

(2) Ampacity. The neutral conductor shall have an ampacity that is not less than the load imposed and be not less than 33⅓ percent of the ampacity of the phase conductors.

Exception: In industrial and commercial premises under engineering supervision, it shall be permissible to size the ampacity of the neutral conductor to not less than 20 percent of the ampacity of the phase conductor.

(3) Existing installations. In addition to the requirements of NEC 250.184(A), the use of a concentric shield as a neutral conductor for extension, replacement, or repair in existing installations is permitted, if all of the following are complied with:

(1) The existing system uses the concentric shield as a neutral conductor;

(2) Each individual conductor contains a separate concentric shield sized to no less than thirty-three and one-third percent of the ampacity of the phase conductor for three phase systems or one hundred percent of the ampacity of the phase conductor for single-phase systems

(3) The new or replacement cable's concentric shield is enclosed inside an outer insulating jacket; and

(4) The existing cable (i.e., existing cable installed directly in the circuit between the work and the circuit's overcurrent device) successfully passes the following tests:

a. Cable maintenance high potential dielectric test. The test must be performed in accordance with the cable manufacturer's instruction or the most recently published ANSI/NETA maintenance test specifications; and
b. Resistance test of the cable shield. Resistance must be based on the type, size, and length of the conductor used as the cable shield using the conductor properties described in NEC Table 8 Conductor Properties.

An electrical engineer must provide a specific certification to the electrical plan review supervisor in writing that the test results of the maintenance high potential dielectric test and the resistance test have been reviewed by the electrical engineer and that the cable shield is appropriate for the installation. The electrical engineer must stamp the certification document with the engineer's stamp and signature. The document must be in the form of a letter or electrical plans.

Testing results are valid for a period of seven years from the date of testing. Cable must not be required to be tested at a shorter interval.

Informational Note: WAC 296-46B-250 (10) has been incorporated into this section.

Δ **(B) Single-Point Grounded Neutral System.** If a single-point grounded neutral system is used, the following shall apply:

(1) A single-point grounded neutral system shall be permitted to be supplied from one of the following:

a. A separately derived system
b. A multigrounded neutral system with an equipment grounding conductor connected to the multigrounded neutral conductor at the source of the single-point grounded neutral system

(2) A grounding electrode shall be provided for the system.

(3) A grounding electrode conductor shall connect the grounding electrode to the system neutral conductor.

(4) A bonding jumper shall connect the equipment grounding conductor to the grounding electrode conductor.

(5) An equipment grounding conductor shall be provided to each building, structure, and equipment enclosure.

(6) A neutral conductor shall only be required if phase-to-neutral loads are supplied.

(7) The neutral conductor, if provided, shall be insulated and isolated from earth except at one location.

(8) An equipment grounding conductor shall be run with the phase conductors and shall comply with all of the following:

a. Shall not carry continuous load

b. Shall be bare, covered, or insulated

c. Shall have ampacity for fault current duty

(C) Multigrounded Neutral Systems. If a multigrounded neutral system is used, the following shall apply:

(1) The neutral conductor of a solidly grounded neutral system shall be permitted to be grounded at more than one point. Grounding shall be permitted at one or more of the following locations:

a. Transformers supplying conductors to a building or other structure

b. Underground circuits if the neutral conductor is exposed

c. Overhead circuits installed outdoors

(2) The multigrounded neutral conductor shall be grounded at each transformer and at other additional locations by connection to a grounding electrode.

(3) At least one grounding electrode shall be installed and connected to the multigrounded neutral conductor every 400 m (1300 ft).

(4) The maximum distance between any two adjacent electrodes shall not be more than 400 m (1300 ft).

(5) In a multigrounded shielded cable system, the shielding shall be grounded at each cable joint that is exposed to personnel contact.

Exception: In a multipoint grounded system, a grounding electrode shall not be required to bond the neutral conductor in an uninterrupted conductor exceeding 400 m (1300 ft) if the only purpose for removing the cable jacket is for bonding the neutral conductor to a grounding electrode.

ARTICLE 300
General Requirements for Wiring Methods and Materials

300.1 Scope.

(A) All Wiring Installations. This article covers general requirements for wiring methods and materials for all wiring installations unless modified by other articles in Chapter 3.

Wiring methods in educational or institutional facilities as defined in this chapter must be metallic or nonmetallic raceways, MI, MC, or AC cable. Places of assembly located within these facilities must comply with NEC 518.4(A).

Exception: Assisted living facility generator systems may be wired and installed in accordance with Article 517, Health Care Facilities, of this Code.

Informational Note: WAC 296-46B-010(13), requirement for wiring method for assisted living facility generators, is incorporated herein with edits as an Exception.

(B) Integral Parts of Equipment. The requirements of this article are not intended to apply to the conductors that form an integral part of equipment, such as motors, controllers, motor control centers, or factory-assembled control equipment or listed utilization equipment.

(C) Metric Designators and Trade Sizes. Metric designators and trade sizes for conduit, tubing, and associated fittings and accessories shall be as designated in Table 300.1(C).

300.4 Protection Against Physical Damage.

Where subject to physical damage, conductors, raceways, and cables shall be protected.

(A) Cables and Raceways Through Wood Members.

Δ **(1) Bored Holes.** In both exposed and concealed locations, where a cable- or raceway-type wiring method is installed through bored holes in joists, rafters, or wood members, holes shall be bored so that the edge of the hole is not less than 32 mm (1 1/4 in.) from the edges of the wood member. Where this distance cannot be maintained, the cable or raceway shall be protected from penetration by screws or nails by a steel plate(s) or bushing(s), at least 1.6 mm (1/16 in.) thick, and of appropriate length and width installed to cover the area of the wiring. Where installed in exterior walls, all wiring and device boxes must be a minimum of 63 mm (2 1/2 in.) from the exterior wall surface of the framing member.

Exception No. 1: Steel plates shall not be required to protect rigid metal conduit, intermediate metal conduit, rigid PVC conduit, RTRC, or electrical metallic tubing.

Exception No. 2: A listed and marked steel plate less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail or screw penetration shall be permitted.

Exception No. 3: The installation of all structural elements and mechanical systems (e.g., framing, plumbing, ducting, etc.) must be complete in the area(s) where electrical inspection is requested. Prior to completion of an exterior wall cover inspection, either: (a) The exterior shear panel or sheathing nail inspection must be completed by the building inspector; or (b) All wiring and device boxes must be a minimum of 63 mm (2 1/2 in.) from the exterior surface of the framing member; or (c) All wiring and device boxes must be protected by a steel plate a minimum of 1.6 mm (1/16 in.) thick of appropriate width and height installed to cover the area of the wiring or box.

Informational Note: WAC 296-46B-010(6), requirements for protecting wiring in walls, are incorporated herein as Exception 3.

(2) Notches in Wood. Where there is no objection because of weakening the building structure, in both exposed and concealed locations, cables or raceways shall be permitted to be laid in notches in wood studs, joists, rafters, or other wood members where the cable or raceway at those points is protected from penetration by 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.

(5) **Nonmetallic-Sheathed Cable.**

a. In both exposed and concealed locations where nonmetallic-sheathed cables, operating at less than 120 volts nominal, pass through either factory- or field-punched, cut, or drilled slots or holes in metal members, the cable shall be protected by listed bushings or listed grommets covering all metal edges that are securely fastened in the opening prior to installation of the cable.

b. Where nonmetallic-sheathed cables operate at 120 volts nominal or greater pass through either factory- or field-punched, cut, or drilled slots or holes in metal members, listed two-piece interlocking bushings or grommets shall be installed prior to passing the cable through such openings.

(6) **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.

Δ **(C) Cables Through Spaces Behind Panels Designed to Allow Access.** Cables or raceway-type wiring methods, installed behind panels designed to allow access shall be supported according to their applicable articles.

(D) Cables and Raceways Parallel to Framing Members and Furring Strips. In both exposed and concealed locations, where a cable- or raceway-type wiring method is installed parallel to framing members, such as joists, rafters, or studs, or is installed parallel to furring strips, the cable or raceway shall be installed and supported so that the nearest outside surface of the cable or raceway is not less than 32 mm (1 1/4 in.) from the nearest edge of the framing member or furring strips where nails or screws are likely to penetrate. Where this distance cannot be maintained, the cable or raceway shall be protected from penetration by nails or screws by a steel plate, sleeve, or equivalent at least 1.6 mm (1/16 in.) thick.

Exception No. 1: Steel plates, sleeves, or the equivalent shall not be required to protect rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, or electrical metallic tubing.

Exception No. 2: For concealed work in finished buildings, or finished panels for prefabricated buildings where such supporting is impracticable, it shall be permissible to fish the cables between access points.

Exception No. 3: A listed and marked steel plate less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail or screw penetration shall be permitted.

Δ **(E) Cables, Raceways, or Boxes Installed in or Under Metal-Corrugated Roof Decking.** A cable, raceway, or box, installed in exposed or concealed locations under metal-corrugated sheet roof decking, shall be installed and supported so there is not less than 38 mm (1 1/2 in.) measured from the lowest surface of the roof decking to the top of the cable, raceway, or box. A cable, raceway, or box shall not be installed in concealed locations in metal-corrugated, sheet decking–type roof.

Informational Note: Roof decking material is often repaired or replaced after the initial raceway or cabling and roofing installation and might be penetrated by the screws or other mechanical devices designed to provide "hold down" strength of the waterproof membrane or roof insulating material.

Exception No. 1: Rigid metal conduit and intermediate metal conduit, with listed steel or malleable iron fittings and boxes, shall not be required to comply with 300.4(E).

Exception No. 2: The 38 mm (1l/2in.) spacing is not required where metal-corrugated sheet roof decking is covered with a minimum thickness 50 mm (2 in.) concrete slab, measured from the top of the corrugated roofing.

(F) Cables and Raceways Installed in Shallow Grooves. Cable- or raceway-type wiring methods installed in a groove, to be covered by wallboard, siding, paneling, carpeting, or similar finish, shall be protected by 1.6 mm (1/16 in.) thick steel plate, sleeve, or equivalent or by not less than 32-mm (1 1/4-in.) free space for the full length of the groove in which the cable or raceway is installed.

Exception No. 1: Steel plates, sleeves, or the equivalent shall not be required to protect rigid metal conduit, intermediate metal conduit, rigid PVC conduit, RTRC 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) Fittings. Where raceways contain 4 AWG or larger insulated circuit conductors, and these conductors enter a cabinet, a box, an enclosure, or a raceway, prior to the installation of conductors, the conductors shall be protected in accordance with any of the following:
(1) An identified fitting providing a smoothly rounded insulating surface

(2) A listed metal fitting that has smoothly rounded edges

(3) Separation from the fitting or raceway using an identified insulating material that is securely fastened in place

(4) Threaded hubs or bosses that are an integral part of a cabinet, box, enclosure, or raceway providing a smoothly rounded or flared entry for conductors

Conduit bushings constructed wholly of insulating material shall not be used to secure a fitting or raceway. The insulating fitting or insulating material shall have a temperature rating not less than the insulation temperature rating of the installed conductors.

(H) Structural Joints. A listed expansion/deflection fitting or other approved means shall be used where a raceway crosses a structural joint intended for expansion, contraction or deflection, used in buildings, bridges, parking garages, or other structures.

300.5 Underground Installations.

(A) Minimum Cover Requirements. Direct-buried cable, conduit, or other raceways shall be installed to meet the minimum cover requirements of Table 300.5(A).

(B) Wet Locations. The interior of enclosures or raceways installed underground shall be considered to be a wet location. Insulated conductors and cables installed in these enclosures or raceways in underground installations shall comply with 310.10(C).

(C) Underground Cables and Conductors Under Buildings. Underground cable and conductors installed under a building shall be in a raceway.

(D) Protection from Damage. Conductors and cables shall be protected from damage in accordance with 300.5(D)(1) through (D)(4).

(1) Emerging from Grade. Direct-buried conductors and cables emerging from grade and specified in Columns 1 and 4 of Table 300.5(A) shall be protected by enclosures or raceways extending from the minimum cover distance below grade required by 300.5(A) to a point at least 2.5 m (8 ft) above finished grade. In no case shall the protection be required to exceed 450 mm (18 in.) below finished grade.
(2) Conductors Entering Buildings. Conductors entering a building shall be protected to the point of entrance.

(3) Service Conductors. Underground service conductors that are not encased in concrete and that are buried 450 mm (18 in.) or more below grade shall have their location identified by a warning ribbon that is placed in the trench at least 300 mm (12 in.) above the underground installation.
(4) Enclosure or Raceway Damage. Where the enclosure or raceway is subject to physical damage, the conductors shall be installed in electrical metallic tubing, rigid metal conduit, intermediate metal conduit, RTRC-XW, Schedule 80 PVC conduit, or equivalent.

(E) Splices and Taps. Direct-buried conductors or cables shall be permitted to be spliced or tapped without the use of splice boxes. The splices or taps shall be made in accordance with **110.14(B)**.

(F) Backfill. Backfill that contains large rocks, paving materials, cinders, large or sharply angular substances, or corrosive material shall not be placed in an excavation where materials might damage raceways, cables, conductors, or other substructures or prevent adequate compaction of fill or contribute to corrosion of raceways, cables, or other substructures.

Where necessary to prevent physical damage to the raceway, cable, or conductor, protection shall be provided in the form of granular or selected material, suitable running boards, suitable sleeves, or other approved means.

(G) Raceway Seals. Conduits or raceways through which moisture might contact live parts shall be sealed or plugged at either or both ends. Spare or unused raceways shall also be sealed. Sealants shall be identified for use with the cable insulation, conductor insulation, bare conductor, shield, or other components.

Informational Note: Presence of hazardous gases or vapors might also necessitate the sealing of underground conduits or raceways entering buildings.

(H) Bushing. A bushing, or terminal fitting, with an integral bushed opening shall be used at the end of a conduit or other raceway that terminates underground where the conductors or cables emerge as a direct burial wiring method. A seal incorporating the physical protection characteristics of a bushing shall be permitted to be used in lieu of a bushing.

(I) Conductors of the Same Circuit. All conductors of the same circuit and, where used, the grounded conductor and all equipment grounding conductors shall be installed in the same raceway or cable or shall be installed in close proximity in the same trench.

Exception No. 1: Conductors shall be permitted to be installed in parallel in raceways, multiconductor cables, or direct-buried single conductor cables. Each raceway or multiconductor cable shall contain all conductors of the same circuit, including equipment grounding conductors. Each direct-buried single conductor cable shall be located in close proximity in the trench to the other single conductor cables in the same parallel set of conductors in the circuit, including equipment grounding conductors.

Exception No. 2: Isolated phase, polarity, grounded conductor, and equipment grounding and bonding conductor installations shall be permitted in nonmetallic raceways or cables with a nonmetallic covering or nonmagnetic sheath in close proximity where conductors are paralleled as permitted in 310.10(G), and where the conditions of 300.20(B) are met.

(J) Earth Movement. Where direct-buried conductors, raceways, or cables are subject to movement by settlement or frost, direct-buried conductors, raceways, or cables shall be arranged so as to prevent damage to the enclosed conductors or to equipment connected to the raceways.

Informational Note: This section recognizes “S” loops in underground direct burial cables and conductors to raceway transitions, expansion fittings in raceway risers to fixed equipment, and, generally, the provision of flexible connections to equipment subject to settlement or frost heaves.

(K) Directional Boring. Cables or raceways installed using directional boring equipment shall be approved for the purpose.

Table 300.5(A) Minimum Cover Requirements, 0 to 1000 Volts ac, 1500 Volts dc, Nominal, Burial in Millimeters (Inches)

Notes:
1. Cover shall be defined as the shortest distance in mm (in.) measured between a point on the top surface of any direct-buried conductor, cable, conduit, or other raceway and the top surface of finished grade, concrete, or similar cover.
2. Raceways approved for burial only where concrete encased shall require a concrete envelope not less than 50 mm (2 in.) thick.
3. Lesser depths shall be permitted where cables and conductors rise for terminations or splices or where access is otherwise required.
4. Where one of the wiring method types listed in Columns 1 through 3 is used for one of the circuit types in Columns 4 and 5, the shallowest depth of burial shall be permitted.
5. Where solid rock prevents compliance with the cover depths specified in this table, the wiring shall be installed in a metal raceway, or a nonmetallic raceway permitted for direct burial. The raceways shall be covered by a minimum of 50 mm (2 in.) of concrete extending down to rock.

((~~6. Directly buried electrical metallic tubing (EMT) shall comply with 358.10.~~))

300.11 Securing and Supporting.
(A) Secured in Place. Raceways, cable assemblies, boxes, cabinets, and fittings shall be securely fastened in place.

Δ **(B) Wiring Systems Installed Above Suspended Ceilings.**
Support wires that do not provide secure support shall not be 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: See ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, for one method of testing to determine fire rating.

(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) <u>Suspended Ceilings.</u>

<u>(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.</u>

<u>(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.</u>

(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:

a. The support wires are minimum #12 AWG and are securely fastened to the structural ceiling and to the ceiling grid system; and

b. 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 or Class 3 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, non-soldered splice point, and switch point for 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 outlet point, switch point, conductor splice

point, conductor junction point, conductor termination point, wiring method transition point, or conductor 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 on-site frame construction, for use with nonmetallic-sheathed cable, shall be permitted in lieu of a box or conduit body.

Informational Note: See 334.30(C); 545.10; 550.15(I); 551.47(E), Exception No. 1; and 552.48(E), Exception No. 1.

(F) Fitting. A fitting identified for the use shall be permitted in lieu of a box or conduit body where conductors are not spliced or terminated within the fitting. The fitting shall be accessible after installation, unless listed for concealed installation.

(G) Direct-Buried Conductors and Cables. 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(C), 426.24(A), and 427.19(A).

Δ **(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 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-Resistive Cables and Conductors. Support methods and spacing intervals for fire-resistive cables and conductors shall comply with any restrictions provided in the listing of the electrical circuit protective system or fire-resistive cable 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) Clamping devices constructed of or employing insulating wedges inserted in the ends of the raceways. Where clamping of insulation does not adequately support the cable, the conductor also shall be clamped.

(2) Inserting boxes at the required intervals in which insulating supports are installed and secured in an approved manner to withstand the weight of the conductors attached thereto, the boxes being provided with covers.

(3) In junction boxes, deflecting the cables not less than 90 degrees and carrying them horizontally to a distance not less than twice the diameter of the cable, with the cables being carried on two or more insulating supports and additionally secured thereto by tie wires, if desired. Where this method is used, cables shall be supported at intervals not greater than 20 percent of the support spacing in Table 300.19(A).

(4) Other approved means.

300.21 Spread of Fire or Products of Combustion. Electrical installations in hollow spaces, vertical shafts, and ventilation or air-handling ducts shall be made so that the possible spread of fire or products of combustion will not be substantially increased. Openings around electrical penetrations into or through fire-resistant-rated walls, partitions, floors, or ceilings shall be firestopped using approved methods to maintain the fire resistance rating. All out-of-service cable shall be removed from accessible ceiling spaces

Informational Note No. 1: Directories of electrical construction materials published by qualified testing laboratories contain many listing installation restrictions necessary to maintain the fire-resistive rating of assemblies where penetrations or openings are made. Building codes also contain restrictions on membrane penetrations on opposite sides of a fire-resistance-rated wall assembly. An example is the 600-mm (24-in.) minimum horizontal separation that usually applies between boxes installed on opposite sides of the wall. Assistance in complying with the requirements of 300.21 can be found in building codes, fire resistance directories, and product listings.

Informational Note No. 2: See also Chapter 9 of the Seattle Building Code for fire protection systems and protection of penetrations of those systems

ARTICLE 314
Outlet, Device, Pull, and Junction Boxes; Conduit Bodies; Fittings; and Handhole Enclosures

Δ **314.23 Supports.** Enclosures within the scope of this article shall be supported in accordance with 314.23(A) through (H) as applicable.

Δ **(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 this section shall be provided.

(B) Structural Mounting. An enclosure supported from a structural member or from grade shall be rigidly supported either directly or by using a metal, polymeric, or wood brace.

(1) Nails and Screws. Nails and screws, where used as a fastening means, shall secure boxes by using brackets on the outside of the enclosure, or by using mounting holes in the back or in one or more sides of the enclosure, or they shall pass through the interior within 6 mm (1⁄4 in.) of the back or ends of the enclosure. Screws shall not be permitted to pass through the box unless exposed threads in the box are protected using approved means to avoid abrasion of conductor insulation. Mounting holes made in the field shall be approved.

(2) Braces. Metal braces shall be protected against corrosion and formed from metal that is not less than 0.51 mm (0.020 in.) thick uncoated. Wood braces shall have a cross section not less than nominal 25 mm × 50 mm (1 in. × 2 in.). Wood braces in wet locations shall be treated for the conditions. Polymeric braces shall be identified as being suitable for the use.

(C) Mounting in Finished Surfaces. An enclosure mounted in a finished surface shall be rigidly secured thereto by clamps, anchors, or fittings identified for the application.

(D) Suspended Ceilings. An enclosure mounted to structural or supporting elements of a suspended ceiling shall be not more than 1650 cm3 (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 300.11(B). 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.

Δ **(E) Raceway-Supported Enclosure, Without Devices, Luminaires, or Lampholders.** An enclosure that does not contain a device(s), other than splicing devices, or supports a luminaire(s), a lampholder, or other equipment and is supported by entering raceways shall not exceed 1650 cm3 (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, IMC

(2) Rigid metal conduit, RMC

(3) Rigid polyvinyl chloride conduit, PVC

(4) Reinforced thermosetting resin conduit, RTRC

(5) Electrical metallic tubing, EMT

(F) Raceway-Supported Enclosures, with Devices, Luminaires, or Lampholders. An enclosure that contains a device(s), other than splicing devices, or supports a luminaire(s), a lampholder, or other equipment and is supported by entering raceways shall not exceed 1650 cm3 (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. A connection to a box equipped with a hub shall be made with a listed cord grip attachment fitting marked for use with a threaded hub.

Flexible cord and cord connections must comply with 314.23(H) of this Code and the following:

a. A suspended pendant box must not contain conduit “knockouts” and connection to a suspended box must utilize an integral threaded hub;

b. The maximum length of the cord for a suspended pendant drop from a permanently installed junction box to a suitable tension take-up device above the pendant box must not exceed six feet;

c. The flexible cord must be supported at each end with an approved cord grip or strain relief connector fitting/device that will eliminate all stress on the conductor connections;

d. The flexible cord must be a minimum No. 14 AWG copper;

e. The flexible cord ampacity must be determined using NEC Table 400.5(A) column A; and

f. The flexible cord must be hard or extra hard usage.

Informational Note: WAC 296-46B-314-023(H), requirements for flexible cord connection of pendant boxes, is incorporated herein.

(2) Conduit. A box supporting lampholders or luminaires, or wiring enclosures within luminaires used in lieu of boxes in accordance with 300.15(B), shall be supported by rigid or intermediate metal conduit stems. For stems longer than 450 mm (18 in.), the stems shall be connected to the wiring system with listed swivel hangers suitable for the location. At the luminaire end, the conduit(s) shall be threaded wrenchtight into the box, wiring enclosure, or identified hubs.

Where supported by only a single conduit, the threaded joints shall be prevented from loosening by the use of set-screws or other effective means, or the luminaire, at any point, shall be at least 2.5 m (8 ft) above grade or standing area and at least 900 mm (3 ft) measured horizontally to the 2.5 m (8 ft) elevation from windows, doors, porches, fire escapes, or similar locations. A luminaire supported by a single conduit shall not exceed 300 mm (12 in.) in any horizontal direction from the point of conduit entry.

ARTICLE 326
Integrated Gas Spacer Cable: Type IGS

326.10 Uses Permitted. Type IGS cable shall be permitted for use underground, including direct burial in the earth, as the following:

(1) ((~~Service-entrance conductors~~)) Reserved
(2) Feeder or branch-circuit conductors
(3) ((~~Service-conductors, underground~~)) Reserved

ARTICLE 330
Metal-Clad Cable: Type MC

330.10 Uses Permitted.
(A) General Uses. Type MC cable shall be permitted as follows:
(1) For ((~~services,~~)) feeders, and branch circuits.

(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 damp or 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 305.15, as appropriate.

(3)((~~Installed as Service-Entrance Cable~~. ~~Type MC cable installed as service-entrance cable shall be permitted in accordance with 230.43.~~)) Not adopted.

(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.

ARTICLE 334
Nonmetallic-Sheathed Cable: Types NM and NMC

334.10 Uses Permitted. Type NM and Type NMC cables shall be permitted to be used in the following, except as prohibited in 334.12:

(1) One- and two-family dwellings and their attached or detached garages, and their storage buildings.

(2) Multi-family dwellings and their detached garages permitted to be of Types III, IV, and V construction. Cables shall be concealed within walls, floors, or ceilings that provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies.

(3) Other structures permitted to be of Types III, IV((~~-HT~~)), and V construction. Cables shall be concealed within walls, floors, or ceilings that provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies.

Informational Note No. 1: See NFPA 220-2021, *Standard on Types of Building Construction*, or the applicable building code, or both for types of building construction and occupancy classification definitions.

Informational Note No. 2: See Informative Annex E for determination of building types.

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

Informational Note No. 3: See 310.14(A)(3) for temperature limitation of conductors.

(5) Types I and II construction where installed within raceways permitted to be installed in Types I and II construction.

(A) Type NM. Type NM cable shall be permitted as follows:

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

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

(B) Type NMC. Type NMC cable shall be permitted as follows:

(1) For ((~~both exposed and~~)) concealed work in dry, wet, damp, or corrosive locations, except as prohibited by 334.10(3)

(2) In outside and inside walls of masonry block or tile

(3) In a shallow chase in masonry, concrete, or adobe protected against nails or screws by a steel plate at least 1.59 mm (1⁄16 in.) thick and covered with plaster, adobe, or similar finish

334.12 Uses Not Permitted.
(A) Types NM and NMC. Types NM and NMC cables shall not be permitted as follows:

(1) In any dwelling or structure not specifically permitted in 334.10(1), (2), (3), and (5)

(2) Exposed within a dropped or suspended ceiling cavity in other than one- and two-family and multifamily dwellings

(3) As service-entrance cable

(4) In commercial garages having hazardous (classified) locations as defined in 511.3

(5) In theaters and similar locations, except where permitted in 518.4(C)

(6) In motion picture studios

(7) In storage battery rooms

(8) In hoistways or on elevators or escalators

(9) Embedded in poured cement, concrete, or aggregate

(10) In hazardous (classified) locations, except where specifically permitted by other articles in this *Code*

(11) High-rise building(s) as defined in Chapter 2 of the Seattle Building Code

(B) Type NM. Type NM cables shall not be used under the following conditions or in the following locations:

(1) Where exposed to corrosive fumes or vapors

(2) Where embedded in masonry, concrete, adobe, fill, or plaster

(3) In a shallow chase in masonry, concrete, or adobe and covered with plaster, adobe, or similar finish

(4) In wet or damp locations

Exception to (4): Wet or damp locations do not include the interior of conduits installed in wet locations outdoors used for physical protection of NM cables under the following conditions:

(a) Cables emerging from a building interior, attic, or crawlspace remain unbroken until terminated; and

(b) Flexible metal conduits are not used; and

(c) No conduit systems are longer than 10 ft or any portion is below grade; and

(d)Conduits are sealed to prevent air movement and are arranged to naturally drain

334.15 Exposed Work.((~~In exposed work,~~)) NM cable shall not be exposed except as ((~~provided in 300.11(B), cable shall be installed as specified in 334.15(A) through (C)~~)) allowed in 334.15(B) through (D) and 334.23.

Nonmetallic-sheathed cable shall be considered as concealed where installed in inaccessible void areas of buildings or where run between or through 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.

Exception: Exposed nonmetallic-sheathed cable that is properly supported may enter the top section only of a surface- mounted panelboard and cabinet where the distance from the top of the panel enclosure to the bottom of the ceiling joist above does not exceed 30 in.

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

Δ **(B) Protection from Physical Damage**. Where exposed, cable shall be protected from physical damage ((~~where necessary~~)) by rigid metal conduit, intermediate metal conduit, electrical metallic tubing, ((~~Schedule 80~~)) PVC conduit, 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, RTRC marked with the suffix -XW, or other approved means extending at least 150 mm (6 in.) above the floor.~~)) Conduit or tubing shall be provided with a bushing or adapter that provides protection from abrasion at the point the cable enters and exits the raceway.

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.

Δ **(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 bushing or adapter that provides protection from abrasion at the point the cable enters and exits the raceway. The sheath of the nonmetallic-sheathed cable shall extend through the conduit or tubing and into the outlet, device, or junction box not less than 6 mm (1⁄4 in.). The cable shall be secured within 300 mm (12 in.) of the point where the cable enters the conduit or tubing. Metal conduit, tubing, and metal outlet boxes shall be connected to an equipment grounding conductor complying with 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.

334.25 Out of service and abandoned conductors. All out-of-service cable and abandoned conductors shall be removed from accessible ceiling and wall spaces unless tagged and terminated at both ends in accordance with 300.15.

ARTICLE 336
Power and Control Cable: Type TC

336.10 Uses Permitted. Type TC cable shall be permitted to be used as follows:

(1) For power, lighting, control, and signal circuits.

(2) In cable trays, including those with mechanically discontinuous segments up to 300 mm (1 ft).

(3) In raceways.

(4) In outdoor locations supported by a messenger wire.

(5) For Class 1 circuits as permitted in Parts II and III of Article 725.

(6) For non-power-limited fire alarm circuits if conductors comply with the requirements of 760.49.

(7) Between a cable tray and the utilization equipment or device(s), provided all of the following apply:

a. The cable is Type TC-ER.

b. The cable is installed in industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation.

c. The cable is continuously supported and protected against physical damage using mechanical protection such as struts, angles, or channels.

d. The cable complies with the crush and impact requirements of Type MC cable and is identified with the marking “TC–ER.”

e. The cable is secured at intervals not exceeding 1.8 m (6 ft).

f. Equipment grounding for the utilization equipment is provided by an equipment grounding conductor within the cable. In cables containing conductors sized 6 AWG or smaller, the equipment grounding conductor shall be provided within the cable or, at the time of installation, one or more insulated conductors shall be permanently identified as an equipment grounding conductor in accordance with 250.119(C).

Exception to (7): Where not subject to physical damage, Type TC-ER shall be permitted to transition between cable trays and between cable trays and equipment or devices for a distance not to exceed 1.8 m (6 ft) without continuous support. The cable shall be mechanically supported where exiting the cable tray to ensure that the minimum bending radius is not exceeded.

(8) Type TC cable shall be resistant to moisture and corrosive agents where installed in wet locations.

(9) For one- and two-family dwelling units, Type TC-ER-JP cable containing conductors for both power and control circuits shall be permitted for branch circuits and feeders. Type TC-ER-JP cable used as interior wiring shall be installed per the requirements of Part II of Article 334 and where installed as exterior wiring shall be installed per the requirements of Part II of Article 340.

Exception: Where used to connect a generator and associated equipment having terminals rated 75°C (140°F) or higher, the cable shall not be limited in ampacity by 334.80 or 340.80.

Informational Note No. 1: See 725.136 for limitations on Class 2 or 3 circuits contained within the same cable with conductors of electric light, power, or Class 1 circuits.

(10) Direct buried, where identified for such use.

(11) In hazardous (classified) locations where specifically permitted by other articles in this Code.

(12) ((~~For service-entrance conductors where identified for such use and marked Type TC-ER.~~)) Reserved.

(13) In addition to the uses allowed in NEC 336.10, Type TC-ER-JP cable may be used in any location allowed for nonmetallic sheathed cable in NEC 334 if all the installation requirements in NEC 336 and 334 and WAC 296-46B-334 are met.

Informational Note No. 2: See 310.14(A)(3) for temperature limitation of conductors.

Informational Note No. 3: WAC 296-46B-336.010 is incorporated herein.

ARTICLE 338
Service Entrance Cables: Types SE and USE

338.10 Uses Permitted.

(A) ((~~Service-Entrance Conductors.~~ ~~Service-entrance cable shall be permitted to be used as service-entrance conductors and shall be installed in accordance with 230.6, 230.7, and Parts II, III, and IV of Article 230~~.))
Reserved.

(B) Branch Circuits or Feeders.

(1) Grounded Conductor Insulated. Type SE service-entrance cables shall be permitted in wiring systems where all of the circuit conductors of the cable are of the thermoset or thermoplastic type.

(2) Use of Uninsulated Conductor. Type SE service-entrance cable shall be permitted for use where the insulated conductors are used for circuit wiring and the uninsulated conductor is used only for equipment grounding purposes.

Exception: In existing installations, uninsulated conductors shall be permitted as a grounded conductor in accordance with 250.32 and 250.140, where the uninsulated grounded conductor of the cable originates in service equipment, and with 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.* Interior installations shall comply with the following:

(1) In addition to the provisions of this article, Type SE service-entrance cable used for interior wiring shall comply with the installation requirements of Part II of Article 334, excluding 334.80.

(2) Where more than two Type SE cables containing two or more current-carrying conductors in each cable are installed in contact with thermal insulation, caulk, or sealing foam without maintaining spacing between cables, the ampacity of each conductor shall be adjusted in accordance with Table 310.15(C)(1).

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

(b) *Exterior Installations.* Exterior installations shall comply with the following:

(1) In addition to the provisions of this article, service-entrance cable used for feeders or branch circuits, where installed as exterior wiring, shall be installed in accordance with Part I of Article 225. The cable shall be supported in accordance with 334.30.
(2) Type USE cable installed as underground feeder and branch circuit cable shall comply with Part II of Article 340.

Exception: Single-conductor Type USE and multi-rated USE conductors shall not be subject to the ampacity limitations of Part II of Article 340

Δ **338.12 Uses Not Permitted.**

(A) Service-Entrance Cable. Type SE cable 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 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. Type USE cable 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 conductor

338.25 Out of service and abandoned conductors. All out-of-service cable and abandoned conductors shall be removed from accessible ceiling and wall spaces unless tagged and terminated at both ends in accordance with 300.15.

ARTICLE 358
Electrical Metallic Tubing: Type EMT

358.10 Uses Permitted.

(A) Exposed and Concealed. The use of EMT shall be permitted for both exposed and concealed work for the following:

(1) In concrete((~~,~~)) not in direct contact with the earth((~~, in direct burial applications with fittings identified for direct burial, or in areas subject to severe corrosive influences where installed in accordance with 358.10(B).~~))

(2) In dry, damp, and wet locations

(3) In any hazardous (classified) location as permitted by other articles in this Code

(4) For manufactured wiring systems as permitted in 604.100(A)(2)

(B) Corrosive Environments.

(1) Galvanized Steel and Stainless Steel EMT, Elbows, and Fittings. Galvanized steel and stainless steel EMT, elbows, and fittings shall be permitted to be installed in concrete((~~,~~)) that is not in direct contact with the earth, or in areas subject to ((~~severe~~)) corrosive influences where protected by corrosion protection and approved as suitable for the condition.

(2) Supplementary Protection of Aluminum EMT. Aluminum EMT shall be provided with approved supplementary corrosion protection where encased in concrete or in direct contact with the earth.

(((~~**(C) Cinder Fill.** Galvanized steel and stainless steel EMT shall be permitted to be installed in cinder concrete or cinder fill where subject to permanent moisture when protected on all sides by a layer of noncinder concrete at least 50 mm (2 in.) thick or when the tubing is installed at least 450 mm (18 in.) under the fill.~~))

(D) 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 No. 1: See 300.6 for protection against corrosion.
Informational Note No. 2: The requirements of 296-46B-358-012(2) ARE INCORPORATED HEREIN.

(E) Physical Damage. Steel and stainless steel EMT shall be permitted to be installed where subject to physical damage.

358.12 Uses Not Permitted. EMT shall not be used under the following conditions:

(1) Where, during installation or afterward, it will be 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

(3) Where protected from corrosion solely by enamel.

(4) Where placed in concrete and the concrete is in direct contact with the earth.

ARTICLE 382
Nonmetallic Extensions

Article 382, Nonmetallic Extensions, is not adopted.

ARTICLE 394
Concealed Knob-and-Tube Wiring

394.1 Scope. This article covers the use, installation, and construction specifications of concealed knob-and-tube wiring.

This article does not prohibit the installation of loose or rolled thermal insulating material in spaces containing existing knob-and-tube wiring provided that all the following conditions are met:

(1) The wiring must be surveyed by an appropriately licensed electrical contractor who must certify in writing to the department that the wiring is in good condition with no evidence of improper overcurrent protection, conductor insulation failure or deterioration, and with no improper connections or splices. The electrical inspector must inspect all repairs, alterations, or extensions to the electrical system.

(2) The insulation must meet Class I specifications as identified in the International Building Code, with a flame spread index of 25 or less as tested using ASTM E84 or UL 723. Foam insulation may not be used with knob-and-tube wiring.

(3) All knob-and-tube circuits must have overcurrent protection in compliance with NEC Table 310.16, 60 degrees centigrade, Column C. Overcurrent protection must be either circuit breakers or Type S fuses.

Informational Note: WAC 296-46B-394, requiring a survey of the condition of the knob and tube wiring in an attic prior to insulating attic, is incorporated herein.

(4) Any energized knob and tube wiring that has been abandoned or serves no purpose must be removed or terminated per 110.14(B).

Part II. Installation

394.10 Uses Permitted. Concealed knob-and-tube wiring shall be permitted to be installed in the hollow spaces of walls and ceilings, or in unfinished attics and roof spaces ((~~as provided by 394.23, only as follows:~~)) when approved by the authority having jurisdiction.

(((~~(1) For extensions of existing installations~~

~~(2) Elsewhere by special permission~~))

394.25 Out of service and abandoned conductors. All out-of-service cable and abandoned conductors shall be removed from accessible ceiling and wall spaces unless tagged and terminated at both ends in accordance with SEC 300.15.

394.56 Splices and Taps. Splices shall be soldered unless approved splicing devices are used. In-line or strain splices shall not be used.

Informational Note: See 300.15 of the Seattle Electrical Code for box requirements relating to non-soldered splices.

ARTICLE 398
Open Wiring on Insulators

Article 398, Open Wiring on Insulators, is not adopted.

ARTICLE 404
Switches

404.3 Enclosure.

(A) General. Switches and circuit breakers shall be of the externally operable type mounted in an enclosure listed for the intended use. The minimum wire-bending space at terminals and minimum gutter space provided in switch enclosures shall be as required in 312.6.

~~*((Exception No. 1: Pendant- and surface-type snap switches and knife switches mounted on an open-face switchboard or panelboard shall be permitted without enclosures.*~~

~~*Exception No. 2: Switches and circuit breakers installed in accordance with* **110.27(A)(1)**~~*, (A)(2), (A)(3), or (A)(4) shall be permitted without enclosures.))*

(B) Used as a Raceway. Enclosures shall not be used as junction boxes, auxiliary gutters, or raceways for conductors feeding through or tapping off to other switches or overcurrent devices, unless the enclosure complies with 312.8.

404.10 Mounting of General-Use Snap Switches, Dimmers, and Control Switches.

(A) ~~**Surface Type.** General-use snap switches, dimmers, and control switches used with open wiring on insulators shall be mounted on insulating material that separates the conductors at least 13 mm (1/2 in.) from the surface wired over.~~ Reserved.

(B) Box Mounted. Flush-type general-use snap switches, dimmers, and control switches mounted in boxes that are set back of the finished surface as permitted in 314.20 shall be installed so that the extension plaster ears are seated against the surface. Flush-type devices mounted in boxes that are flush with the finished surface or project from it shall be installed so that the mounting yoke or strap of the device is seated against the box. Screws used for the purpose of attaching a device to a box shall be of the type provided with a listed device, or shall be machine screws having 32 threads per inch or part of listed assemblies or systems, in accordance with the manufacturer's instructions.

404.13 Knife Switches.

(A) Isolating Switches. Knife switches rated at over 1200 amperes at 250 volts or less, and at over 1000 amperes at 251 to 1000 volts, shall be used only as isolating switches and shall not be opened under load.

(B) To Interrupt Currents. To interrupt currents over 1200 amperes at 250 volts, nominal, or less, or over 600 amperes at 251 to 1000 volts, nominal, a circuit breaker or a switch listed for such purpose shall be used.

(C) General-Use Switches. Knife switches of ratings less than specified in 404.13(A) and (B) shall be considered general-use switches.

Informational Note: See Article 100 for the definition of *general-use switch*.

Δ **(D) Motor-Circuit Switches.** Motor-circuit switches shall be permitted to be of the knife-switch type.

Informational Note: See Article 100 for the definition of *motor-circuit switch*.

(**E**) **Interlocking.** All switches shall be of an interlocking type to prevent the door from being opened when the switch is in the ON position. All switches used as service disconnecting means or those rated over 250 volts shall be

of the two- way interlocking type. For the purpose of this provision, “two-way interlocking” means that the door is prevented from being opened when the switch is ON and prevents the switch from being turned ON when the door is open.

ARTICLE 410
Luminaires, Lampholders, and Lamps

410.10 Luminaires in Specific Locations.

(A) Wet and Damp Locations. Luminaires installed in wet or damp locations shall be installed such that water cannot enter or accumulate in wiring compartments, lampholders, or other electrical parts. All luminaires installed in wet locations shall be marked as suitable for wet locations. All luminaires installed in damp locations shall be marked as suitable for wet locations or suitable for damp locations.

(B) Corrosive Locations. Luminaires installed in corrosive locations shall be of a type suitable for such locations.

(C) In Ducts or Hoods.
Luminaires shall be permitted to be installed in commercial cooking hoods where all of the following conditions are met:

(1) The luminaire shall be identified for use within commercial cooking hoods and installed such that the temperature limits of the materials used are not exceeded.

(2) The luminaire shall be constructed so that all exhaust vapors, grease, oil, or cooking vapors are excluded from the lamp and wiring compartment. Diffusers shall be resistant to thermal shock.

(3) Parts of the luminaire exposed within the hood shall be corrosion resistant or protected against corrosion, and the surface shall be smooth so as not to collect deposits and to facilitate cleaning.

(4) Wiring methods and materials supplying the luminaire(s) shall not be exposed within the cooking hood.

Informational Note: See 110.11 for conductors and equipment exposed to deteriorating agents.

(D) Bathtub and Shower Areas. A luminaire installed in a bathtub or shower area shall meet all of the following requirements:

(1) No parts of cord-connected luminaires, chain-, cable-, or cord-suspended luminaires, lighting track, pendants, or ceiling-suspended (paddle) fans with luminaire (light kit) 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.

(2) Luminaires located within the actual outside dimension of the bathtub or shower to a height of 2.5 m (8 ft) vertically from the top of the bathtub rim or shower threshold or within 5 feet of the waterline shall be marked suitable for damp locations or marked suitable for wet locations. Luminaires located where subject to shower spray shall be marked suitable for wet locations. Luminaires, with exposed metal parts that are grounded, must be ground fault circuit interrupter protected.

Informational Note: WAC 296-46B-410 requirements for protective equipment are incorporated herein with edits.

(E) Luminaires in Indoor Sports, Mixed-Use, and All-Purpose Facilities. Luminaires subject to physical damage, using a mercury vapor or metal halide lamp, installed in playing and spectator seating areas of indoor sports, mixed-use, or all-purpose facilities shall be of the type that protects the lamp with a glass or plastic lens. Such luminaires shall be permitted to have an additional guard.

(F) Luminaires Installed in or Under Roof Decking. Luminaires installed in exposed or concealed locations under roof decking where subject to physical damage shall be installed and supported so there is not less than 38 mm (1 1⁄2 in.) measured from the lowest surface of the roof decking to the top of the luminaire.

Exception: The 38 mm (1 1/2 in.) spacing is not required where metal-corrugated sheet roof decking is covered with a minimum thickness 50 mm (2 in.) concrete slab, measured from the top of the corrugated roofing.

ARTICLE 440
Air-Conditioning and Refrigerating Equipment

440.14 Location.
Disconnecting means shall be located within sight from, and readily accessible from, the air-conditioning or refrigerating equipment. The disconnecting means shall be permitted to be installed on or within the air-conditioning or refrigerating equipment. Disconnecting means shall meet the working space requirements of 110.26(A).

The disconnecting means shall not be located on panels that are designed to allow access to the air-conditioning or refrigeration equipment or where it obscures 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 No 3: In dwelling units, if an indoor unit is served from a separate circuit than the exterior unit, the disconnecting means shall be within sight of the unit, or be capable of being locked in the open position in compliance with 110.25.

Informational Note: See Parts VII and IX of Article 430 for additional requirements.

ARTICLE 450
Transformers and Transformer Vaults (including Secondary Ties)

Δ 450.9 Ventilation.

The ventilation shall dispose of the transformer full-load heat losses without creating a temperature rise that is in excess of the transformer rating.

Informational Note No. 1: See IEEE C57.12.00-2015, *General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers*, and IEEE C57.12.01-2020, *General Requirements for Dry-Type Distribution and Power Transformers*, for additional information.

Informational Note No. 2: See IEEE C57.110-2018, *Recommended Practice for Establishing Liquid-Filled and Dry-Type Power and Distribution Transformer Capability When Supplying Nonsinusoidal Load Currents*, for more information where transformers are used with nonlinear loads that have nonsinusoidal currents that can result in additional losses and transformer heating.

Informational Note No. 3: See *Seattle Building Code* Chapter 4, *Special Detailed Requirements Based on Use and Occupancy*, for additional private and utility vault ventilation and other minimum construction requirements.

Transformers with ventilating openings shall be installed so that the ventilating openings are not blocked by walls or other obstructions. The required clearances shall be clearly marked on the transformer. Transformer top surfaces that are horizontal and readily accessible shall be marked to prohibit storage.

450.19 Location of Pad-Mounted Transformers.

To determine the approved location of pad-mounted transformers, see *Seattle Building Code* Chapter 4 for private and utility vault minimum standards.

450.20 Rating of Dry-Type Transformers.

Dry-type transformers shall be rated not less than the load served as determined in accordance with Article 220 of this *Code*.

450.26 Oil-Insulated Transformers Installed Indoors.

Oil-insulated transformers installed indoors shall be installed in a vault constructed as specified in ((~~Part III of this article~~)) Chapter 4 of the *Seattle Building Code*.

((~~Exception No. 1: Where the total capacity does not exceed 112 1/2 kVA, the vault specified in Part III of this article shall be permitted to be constructed of reinforced concrete that is not less than 100 mm (4 in.) thick.~~))

Exception No. 2: Where the nominal voltage does not exceed 1000, 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: 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: A transformer that has a total rating not exceeding 75 kVA and a supply voltage of 1000 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: Transformers shall be permitted to be installed in a detached building that does not comply with ~~Part III of this article~~ Chapter 4 of the Seattle Building Code if neither the building nor its contents present a fire

hazard to any other building or property, and if the building is used only in supplying electric service and the interior is accessible only to qualified persons.

~~*((Exception No. 6: Oil-insulated transformers shall be permitted to be used without a vault in portable and mobile surface mining equipment (such as electric excavators) if each of the following conditions is met:*~~
~~*(1) Provision is made for draining leaking fluid to the ground.*~~

~~*(2) Safe egress is provided for personnel.*~~

~~*(3) A minimum 6-mm (1/4-in.) steel barrier is provided for personnel protection.))*~~

450.27 Oil-Insulated Transformers Installed Outdoors.
((~~Combustible material, combustible buildings, and parts of buildings, fire escapes, and door and window openings shall be safeguarded from fires originating in oil-insulated transformers installed on roofs, attached to or adjacent to a building or combustible material.~~

~~In cases where the transformer installation presents a fire hazard, one or more of the following safeguards shall be applied according to the degree of hazard involved:~~

~~(1) Space separations~~

~~(2) Fire-resistant barriers~~

~~(3) Automatic fire suppression systems~~

~~(4) Enclosures that confine the oil of a ruptured transformer tank~~

~~Oil enclosures shall be permitted to consist of fire-resistant dikes, curbed areas or basins, or trenches filled with coarse, crushed stone. Oil enclosures shall be provided with trapped drains where the exposure and the quantity of oil involved are such that removal of oil is important.~~

~~Informational Note: See ANSI/IEEE C2-2017, National Electrical Safety Code, for additional information on transformers installed on poles or structures or underground.~~))

(A) Requirements. Oil-insulated transformers installed outdoors shall meet the following requirements:

(1) A transformer installed adjacent to a building or structure having any 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.

(2) A transformer installed adjacent to a building or structure with no combustible surface(s) 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.

(3) A building or structure shall have no doorway, 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.

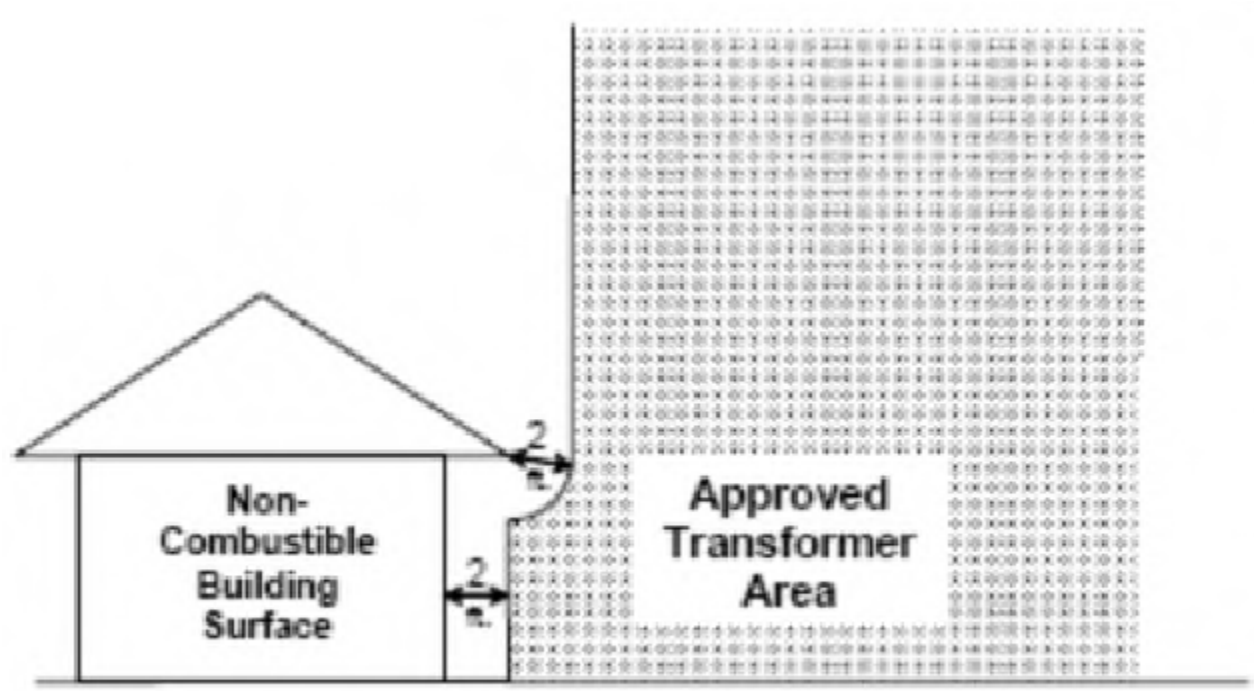


Figure 450-2

(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.

Informational Note: WAC 296-46B-450 Equipment for general use – Transformers and transformer vaults. 027 flammable-liquid or oil-filled transformers installed outdoors.

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.

ARTICLE 500
Hazardous (Classified) Locations Classes I, II, and III, Divisions 1 and 2

500.5 Classifications of Locations.

Δ (A) General.

***N* (1) Hazardous (Classified) Locations.** 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.

Informational Note: Through the exercise of ingenuity in the layout of electrical installations for hazardous (classified) locations, it is frequently possible to locate much of the equipment in a reduced level of classification or in an unclassified location to reduce the amount of special equipment required.

***N* (2) Refrigerant Machinery Rooms Using Ammonia**. 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: See ANSI/IIAR 2, *Standard for Design of Safe Closed-Circuit Ammonia Refrigeration Systems*, for information on classification and ventilation of areas involving 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 might 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 ignitable 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

Informational Note: 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 might escape
(8) Inadequately ventilated pump rooms for flammable gas or for volatile flammable liquids
(9) Interiors of refrigerators and freezers in which volatile flammable materials are stored in open, lightly stoppered, or easily ruptured containers

(10) Inside of inadequately vented enclosures containing instruments normally venting flammable gases or vapors to the interior of the enclosure
(11) Inside of vented tanks containing volatile flammable liquids
(12) Area between inner and outer roof sections of floating roof tanks containing volatile flammable fluids
(13) Inadequately ventilated areas within spraying or coating operations using volatile flammable fluids
(14) Interior of exhaust ducts used to vent ignitible concentrations of gases or vapors
(15) All other locations where ignitible concentrations of flammable vapors or gases are likely to occur during normal operations

Experience has demonstrated the prudence of avoiding the installation of instrumentation or other electrical equipment in the areas covered in list items (11) through (15). Where it cannot be avoided because it is essential to the process and other locations are not feasible, electrical equipment or instrumentation approved for the specific application or consisting of intrinsically safe systems might be considered.

(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: WAC 296-46B-501 001 (3) Any Residential or non- residential system that has building or structure floor drains being discharged into the system is classified as Class I Division I. Drains from any commercially made tub, shower, basin, sink or toilet are not considered floor drains.

ARTICLE 501
Class I Locations

501.2 Sewage disposal systems.

(1) Pumping chambers for sewage, effluent, or grinder pumps in on-site and septic tank effluent pump (S.T.E.P.) disposal systems will be considered unclassified when not more than five residential units are connected to the system, residential units are connected to a utility sewage system, or when nonresidential systems have residential loading characteristics and all of the following general installations requirements are complied with:

a. The pumping chamber must be adequately vented. Venting may be accomplished through the building or structure plumbing vents where the system venting has been approved by the local jurisdiction authority or by a direct two-inch minimum vent to the atmosphere;

b. Equipment that in normal operation may cause an arc or spark must not be installed in any pumping chamber;

c. Float switches installed in a pumping chamber must be hermetically sealed to prevent the entrance of gases or vapors;

d. Junction boxes, conduits and fittings installed in the septic atmosphere must be of a noncorrosive type, installed to prevent the entrance of gases or vapors;

e. Where a conduit system is installed between the pumping chamber and the control panel, motor disconnect, or power source, an approved sealing method must be installed to prevent the migration of gases or vapors from the pumping chamber, and must remain accessible; and

f. Wire splices in junction boxes installed in pumping chambers must be suitable for wet locations.

(2) Residential wastewater loading characteristics in a nonresidential installation:

a. For systems that process less than three thousand five hundred gallons of wastewater per day may be certified by:
(1) An on-site wastewater designer licensed under chapter 18.210 RCW; or
(2) A professional engineer, engaged in the business of on-site wastewater system design, licensed under chapter 18.43 RCW.

b. For systems that process three thousand five hundred gallons or more of wastewater per day may be certified by a professional engineer, engaged in the business of on-site wastewater system design, licensed under chapter 18.43 RCW. Written documentation must be signed and stamped by the designer or engineer and provided to the electrical inspector prior to inspection.

(3) Any residential or nonresidential system that has building or structure floor drains being discharged into the system is classified as Class I Division 1. Drains from any commercially made tub, shower, basin, sink, or toilet are not considered floor drains.

(4) Pumping chamber access covers can be covered by gravel, light aggregate, or noncohesive granulated soil, and must be accessible for excavation. Access covers that are buried must have their exact location identified at the Page 33 of 118 WAC 296-46B-505 Class I, Zone 0, 1, and 2 Locations. electrical panel or other prominent location by an identification plate. The authority having jurisdiction for performing electrical inspections must approve the identification plate location.

(5) Indoor grinder pumps installed in chambers with less than fifty gallons capacity are not required to meet the requirements of this section, except for the venting requirements in subsection (1)(a) of this section. Indoor grinder pumps installed in chambers with less than fifty gallons capacity are not classified systems as described in Article 500 NEC.

(6) Secondary treatment effluent pumping chambers such as sand filters are unclassified, and require no special wiring methods.

(7) Inspection approval is required prior to covering or concealing any portion of the septic electrical system, including the pump. New septic and effluent tanks containing electrical wires and equipment must be inspected and approved prior to being loaded with sewage.

(8) On-site sewage disposal systems using pumps must have audible and visual alarms designed to alert the resident of a malfunction. The alarm must be placed on a circuit independent of the pump circuit.

Informational Note: WAC 296-46B-501 001 Special occupancies – NEC Class I locations are incorporated herein.

ARTICLE 505
Zone 0, 1 and 2 Locations

Δ 505.7 Special Precaution.
This article requires equipment, construction and installation that ensures safe performance under conditions of proper use and maintenance.

Informational Note No. 1: It is important that inspection authorities and users exercise more than ordinary care regarding the installation and maintenance of electrical equipment in hazardous (classified) locations.

Informational Note No. 2: Electrical equipment that is dependent on the protection technique permitted by 505.8(A) might not be suitable for use at temperatures lower than -20°C (-4°F) unless they are identified for use at lower temperatures. Low ambient conditions require special consideration. At low ambient temperatures, flammable concentrations of vapors might not exist in a location classified at normal ambient temperature.

(A) Implementation of Zone Classification System. Classification of areas, engineering and design, selection of equipment and wiring methods, installation, and inspection shall be performed by qualified persons. For the purposes of NEC 505.7, qualified person means a professional engineer registered in Washington.

Informational Note: WAC 296-46B-505 007 Implementation of Zone Classification

(B) Dual Classification. In instances of areas within the same facility classified separately, Zone 2 locations shall be permitted to abut, but not overlap, Class I, Division 2 locations. Zone 0 or Zone 1 locations shall not abut Class I, Division 1 or Division 2 locations.

(C) Reclassification Permitted. A Class I, Division 1 or Division 2 location shall be permitted to be reclassified as a Zone 0, Zone 1, or Zone 2 location, provided all of the space that is classified because of a single flammable gas or vapor source is reclassified under the requirements of this article.

(D) Solid Obstacles. Flameproof equipment with flanged joints shall not be installed such that the flange openings are closer than the distances shown in Table 505.7(D) to any solid obstacle that is not a part of the equipment (such as steelworks, walls, weather guards, mounting brackets, pipes, or other electrical equipment) unless the equipment is listed for a smaller distance of separation.

Table 505.7(D) Minimum Distance of Obstructions from Flameproof "d" Flange Openings

	Minimum Distance	
Gas Group	**mm**	**in.**
IIC	40	137⁄64
IIB	30	13⁄16
IIA	10	25⁄64

(E) Simultaneous Presence of Flammable Gases and Combustible Dusts or Fibers/Flyings. Where flammable gases, combustible dusts, or fibers/flyings are or may be present at the same time, the simultaneous presence shall be considered during the selection and installation of the electrical equipment and the wiring methods, including the determination of the safe operating temperature of the electrical equipment.

(F) Available Fault Current for Type of Protection "e". Unless listed and marked for connection to circuits with higher available fault current, the available fault current for electrical equipment using type of protection "e" for the field wiring connections in Zone 1 locations shall be limited to 10,000 rms symmetrical amperes to reduce the likelihood of ignition of a flammable atmosphere by an arc during a short-circuit event.

Informational Note: Limitation of the available fault current to this level may require the application of current-limiting fuses or current-limiting circuit breakers.

ARTICLE 514
Motor Fuel Dispensing Facilities

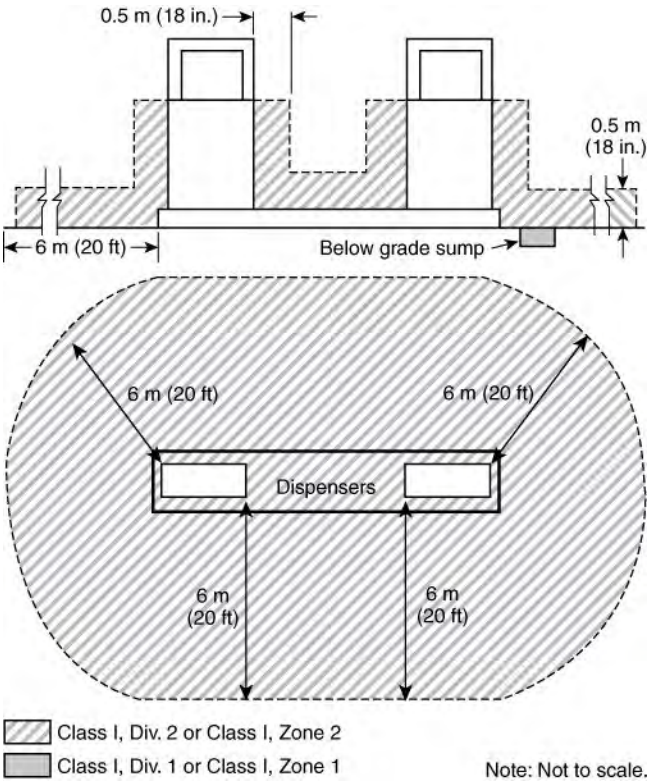
514.1 Scope.
This article shall apply to motor fuel dispensing facilities, marine/motor fuel dispensing facilities, liquefied flammable gas storage or transfer facilities, motor fuel dispensing facilities located inside buildings, and fleet vehicle motor fuel dispensing facilities.

Informational Note 1: The requirements of WAC 296-46B-514 001 are incorporated herein.

Informational Note 2: See NFPA 30A-2021, *Code for Motor Fuel Dispensing Facilities and Repair Garages*, for information regarding safeguards for motor fuel dispensing facilities and for extracted text that is followed by a reference in brackets. Only editorial changes were made to the extracted text to make it consistent with this *Code*.

514.3 Classification of Locations.
Where the term "Class I" is used with respect to Zone classifications within this article of the *Code*, it shall apply to Zone 0, Zone 1, and Zone 2 designations.

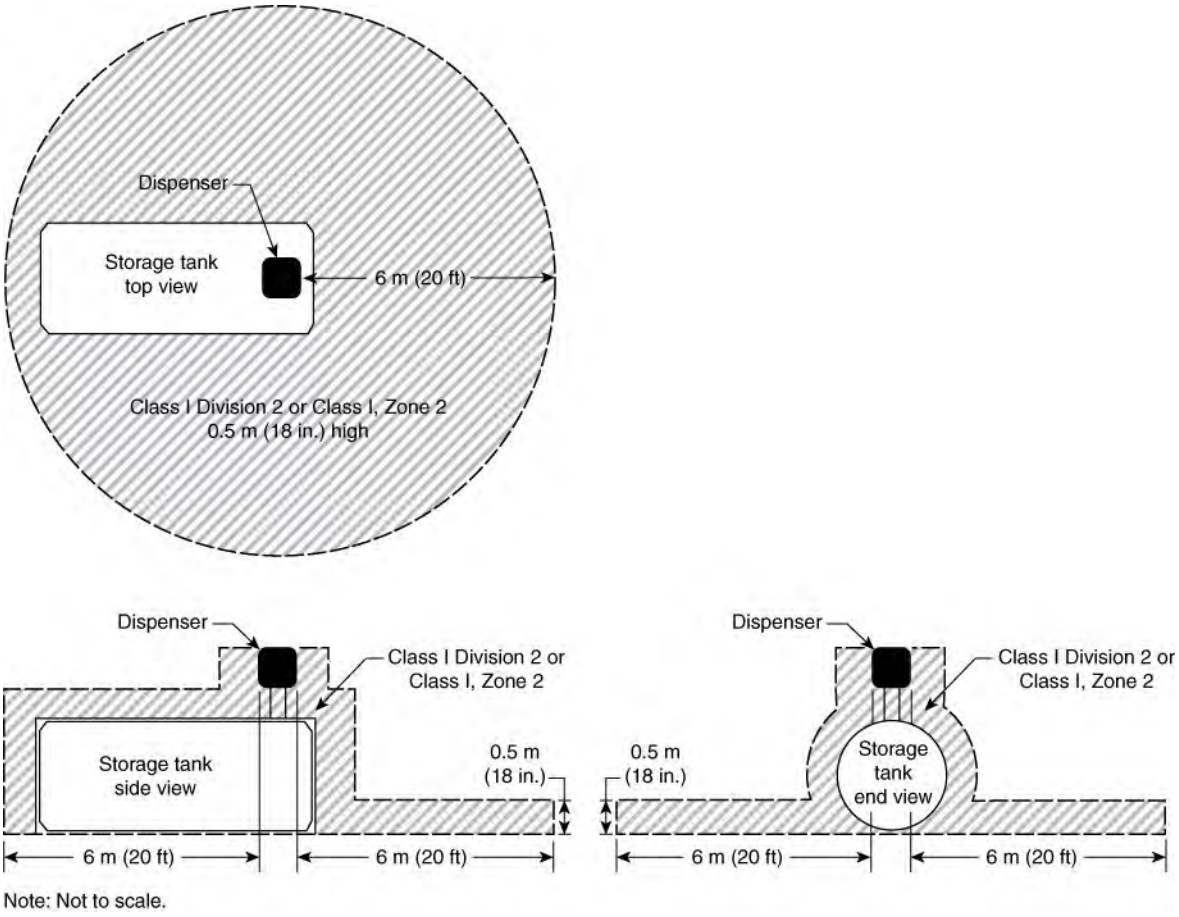
Informational Note: The term "Class I" was originally included as a prefix to Zone 0, Zone 1, and Zone 2 locations and references as an identifier for flammable gases, vapors, or liquids to differentiate from Class II and Class III locations. Zone 0, Zone 1, and Zone 2 only apply to flammable gases, vapors, or liquids so the "Class I" prefix is redundant and has been deleted, except for text that is extracted from other documents or to remain consistent throughout this article.



[See Figure 514.3.]

(A) Unclassified Locations. Where the authority having jurisdiction can satisfactorily determine that flammable liquids having a flash point below 38°C (100°F), such as gasoline, will not be handled, such location shall not be required to be classified.

(B) Classified Locations.
[See Figure 514.3(B).]



Note: Not to scale.

(1) Class I Locations. Table 514.3(B)(1) shall be applied where Class I liquids are stored, handled, or dispensed and shall be used to delineate and classify motor fuel dispensing facilities and commercial garages as defined in Article 100. Table 515.3 shall be used for the purpose of delineating and classifying aboveground tanks. A Class I location shall not extend beyond an unpierced wall, roof, or other solid partition. [30A:8.1, 8.2, 8.3]

Δ **(2) Compressed Natural Gas, Liquefied Natural Gas, and Liquefied Petroleum Gas Areas**. Table 514.3(B)(2) shall be used to delineate and classify areas where CNG, LNG, compressed or liquefied hydrogen, LP-Gas, or combinations of these, are dispensed as motor vehicle fuels along with Class I or Class II liquids that are also dispensed as motor vehicle fuels. [30A:12.1]

Where CNG or LNG dispensers are installed beneath a canopy or enclosure, either the canopy or enclosure shall be designed to prevent accumulation or entrapment of ignitible vapors or all electrical equipment installed beneath the canopy or enclosure shall be suitable for Class I, Division 2 hazardous (classified) locations. [30A:12.4]

Dispensing devices for LP-Gas shall be located as follows:

(1) At least 3 m (10 ft) from any dispensing device for Class I liquids

(2) At least 1.5 m (5 ft) from any dispensing device for Class I liquids where the following conditions exist:

a. The LP-Gas deliver nozzle and filler valve release no more than 4 cm3 (0.1 oz) of liquid upon disconnection.

b. The fixed maximum liquid level gauge remains closed during the entire refueling process. [30A:12.5.2]

Informational Note No. 1: See NFPA 58, Liquefied Petroleum Gas Code, for requirements on dispensing devices for LP-Gas.

Informational Note No. 2: See NFPA 58, Liquefied Petroleum Gas Code, and NFPA 59, Utility LP-Gas Plant Code, for information on classified areas pertaining to LP-Gas systems other than residential or commercial.

Informational Note No. 3: See 514.3(C) for motor fuel dispensing stations in marinas and boatyards.

514.11 Circuit Disconnects

Δ **(A) Emergency Electrical Disconnects.** Fuel dispensing systems shall be provided with one or more clearly identified emergency shutoff devices or electrical disconnects. Such devices or disconnects shall be installed in approved locations but not less than 6 m (20 ft) or more than 30 m (100 ft) from the fuel dispensing devices that they serve. Emergency shutoff devices or electrical disconnects shall disconnect power to all dispensing devices; to all remote pumps serving the dispensing devices; to all associated power, control, and signal circuits; and to all other electrical equipment in the hazardous (classified) locations surrounding the fuel dispensing devices. When more than one emergency shutoff device or electrical disconnect is provided, all devices shall be interconnected. Resetting from an emergency shutoff condition shall require manual intervention and the manner of resetting shall be approved by the authority having jurisdiction. [30A:6.7] The emergency shutoff device shall disconnect simultaneously from the source of supply, all conductors of the circuits, including the grounded conductor, if any. Equipment grounding conductors shall remain connected.

An emergency disconnecting means or operator must be provided to disconnect the pump or dispensing equipment serving gasoline, volatile flammable liquids, or liquefied flammable gases. The emergency disconnecting means or operator must disconnect all conductors of the circuit supplying all station dispensers and/or pumps (including the grounded conductor) simultaneously from the source(s) of supply. The disconnecting means must be labeled with an identification plate, with letters at least 1 inch high, as the emergency disconnecting means. The disconnecting means or operator must be substantially red in color.

Exception: Intrinsically safe systems shall not be required to meet this requirement.

(B) Attended Self-Service Motor Fuel Dispensing Facilities.
At attended motor fuel dispensing facilities, the devices or disconnects shall be readily accessible to the attendant. [30A:6.7.1]

(C) Unattended Self-Service Motor Fuel Dispensing Facilities.
At unattended motor fuel dispensing facilities, the devices or disconnects shall be readily accessible to patrons and at least one additional device or disconnect shall be readily accessible to each group of dispensing devices on an individual island. [30A:6.7.2]

(D) Installations with only one dispensing device. The emergency disconnecting means/operator may be used to satisfy subsection (3) of this section.

(E) Multicircuit Installations. An electrically held normally open contactor operated by a push-button may serve as the disconnecting means to satisfy subsection (3) of this section. If a disconnecting pushbutton is used, the

pushbutton may not function as the resetting mechanism for the electrically held contactor. The resetting means must be:

(1) Located at least 15 feet or out of sight from the disconnecting pushbutton;
(2) Installed behind a cover or guard; and
(3) Identified with an identification plate that is substantially black in color.

Informational Note: WAC 296-46B-514 011 Emergency disconnecting means - Dispensing and service stations.

ARTICLE 517
Healthcare Facilities

517.31 Requirements for the Essential Electrical System.

(A) Separate Branches. Type 1 essential electrical systems shall be comprised of three separate branches capable of supplying a limited amount of lighting and power service that is considered essential for life safety and effective hospital operation during the time the normal electrical service is interrupted for any reason. The three branches are life safety, critical, and equipment.

The division between the branches shall occur at transfer switches where more than one transfer switch is required. [99:6.7.2.3.1]

(B) Transfer Switches. Transfer switches shall be in accordance with one of the following:

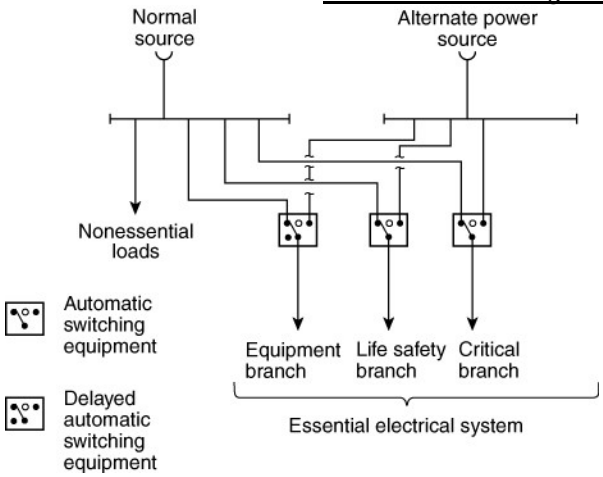
(1) The number of transfer switches to be used shall be based on reliability and design. Each branch of the essential electrical system shall have one or more transfer switches.

(2) One transfer switch shall be permitted to serve one or more branches in a facility with a continuous load on the switch of 150 kVA (120 kW) or less. [99:6.7.6.2.1.4]

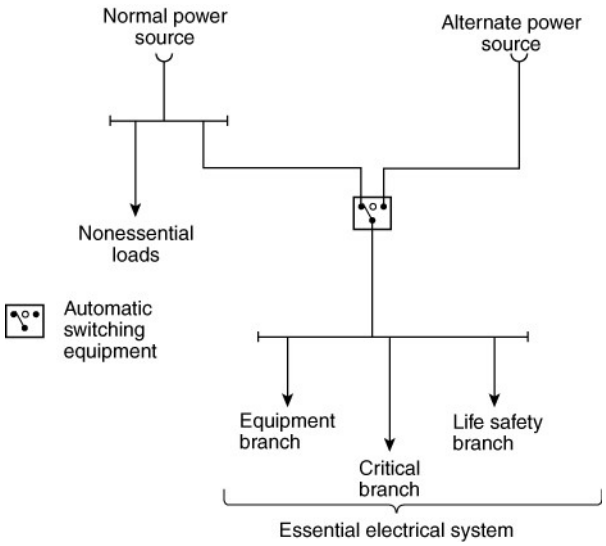
Informational Note No. 1: See NFPA 99-2021, *Health Care Facilities Code*, 6.7.3.1, 6.7.2.2.5, 6.7.2.2.5.15, and 6.7.2.2.7, for more information on transfer switches.

Informational Note No. 2: See **Informational Note Figure 517.31(B)(1)**.

Informational Note No. 3: See **Informational Note Figure 517.31(B)(2)**.



Δ **Informational Note Figure 517.31(B)(1)** Type 1 Essential Electrical System — Minimum Requirement (Greater Than 150 kVA) for Transfer Switch Arrangement.



Δ **Informational Note Figure 517.31(B)(2)** Type 1 Essential Electrical System — Minimum Requirement (150 kVA or Less) for Transfer Switch Arrangement.

(1) Optional Loads. Loads served by the generating equipment not specifically named in this article shall be served by their own transfer switches such that the following conditions apply:

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

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

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

(C) Wiring Requirements.

Δ **(1) Separation from Other Circuits.** The life safety branch and critical branch [of the essential electrical system] shall be kept independent of all other wiring and equipment. [99:6.7.5.2.1]

(a) Raceways, cables, or enclosures of the life safety and critical branch shall be readily identified as components of the essential electrical system (EES). Boxes and enclosures (including transfer switches, generators, and power panels) shall be field- or factory-marked and identified as components of the EES. Raceways and cables shall be field- or factory-marked as components of the EES at intervals not to exceed 7.6 m (25 ft).

(b) Conductors of the life safety branch or critical branch shall not enter the same raceways, boxes, or cabinets with each other or any other wiring system. Branch conductors shall be permitted to occupy common equipment, raceways, boxes, or cabinets of other circuits not part of the life safety branch and critical branch where such wiring complies with one of the following:

(1) Is in transfer equipment enclosures

(2) Is in exit or emergency luminaires supplied from two sources

(3) Is in a common junction box attached to exit or emergency luminaires supplied from two sources

(4) Is for two or more circuits supplied from the same branch and same transfer switch

(c) The wiring of the equipment branch shall be permitted to occupy the same raceways, boxes, or cabinets of other circuits that are not part of the essential electrical system.

(d) Where Category 2 locations are served from two separate transfer switches on the essential electrical system in accordance with 517.18(A), Exception No. 3, the Category 2 circuits from the two separate systems shall be kept independent of each other.

(e) Where Category 1 locations are served from two separate transfer switches on the essential electrical system in accordance with 517.19(A), Exception No. 2, the critical care circuits from the two separate systems shall be kept independent of each other.

(2) Isolated Power Systems. Where isolated power systems are installed in any of the areas in 517.34(A)(1) and (A)(2), each system shall be supplied by an individual circuit serving no other load.

Δ **(3) Mechanical Protection of the Essential Electrical System.** The wiring of the life safety and critical branches shall be mechanically protected by raceways. Where installed as branch circuits in patient care spaces, the installation shall comply with the requirements of 517.13(A) and (B) and 250.118. Only the following wiring methods shall be permitted:

(1) Nonflexible metal raceways, Type MI cable, RTRC marked with the suffix –XW, or Schedule 80 PVC conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care spaces.

(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 spaces.

(3) Listed flexible metal raceways and listed metal sheathed cable assemblies, as follows:

a. Where used in listed prefabricated medical headwalls

b. In listed office furnishings

c. Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage

d. Where necessary for flexible connection to equipment

e. For equipment that requires a flexible connection due to movement, vibration, or operation

f. Luminaires installed in ceiling structures

(4) Flexible power cords of appliances or other utilization equipment connected to the essential electrical system.

(5) Cables for Class 2 or Class 3 systems permitted in Part VI of this article, with or without raceways.

Informational Note: See 517.13 for additional grounding requirements in patient care areas.

Δ **(D) Capacity of Systems.** The essential electrical system shall have the capacity and rating to meet the maximum actual demand likely to be produced by the connected load.

Feeders shall be sized in accordance with 215.2 and Part III of Article 220. The alternate power source(s) required in 517.30 shall have the capacity and rating to meet the demand produced by the load at any given time. Demand calculations for sizing of the alternate power source(s) shall be based on any of the following:

(1) Prudent demand factors and historical data

(2) Connected load

(3) Feeder calculations

(4) Any combination of the above

The sizing requirements in 700.4 and 701.4 shall not apply to alternate sources.

(E) Receptacle Identification. The electrical receptacles or the cover plates for the electrical receptacles supplied from the life safety and critical branches shall have a distinctive color or marking so as to be readily identifiable. [99:6.7.2.2.5(B)]

(F) Feeders from Alternate Power Source.
A single feeder supplied by a local or remote alternate power 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: Coordination shall not be required 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: Coordination shall not be required between overcurrent protective devices of the same size (ampere rating) in series.

Informational Note No. 1: The terms *coordination* and *coordinated* as used in this section do not cover the full range of overcurrent conditions.

Informational Note No. 2: See 517.17(C) for information on requirements for the coordination of ground-fault protection.

ARTICLE 555
Marinas, Boatyards, Floating Buildings, and Commercial and Noncommercial Docking Facilities

555.4 Location of Service Equipment.
The service equipment for a floating building, dock, or marina shall be located on land no closer than 1.5 m (5 ft) horizontally from and adjacent to the structure served, but not on or in the structure itself or any other floating structure. Service equipment shall be elevated a minimum of 300 mm (12 in.) above the electrical datum plane.
Exception: In existing installations, the service may be located in or on the building only by prior approval from the authority having jurisdiction.

555.5 Maximum Voltage.
Pier Power distribution shall not exceed 250 volts phase to phase. Pier power distribution systems, where qualified personnel service the equipment under engineering supervision, shall be permitted to exceed 250 volts but these systems shall not exceed 600 volts.

555.7 Transformers.
(A) General. Transformers and enclosures shall be identified for wet locations. The bottom of transformer enclosures shall not be located below the electrical datum plane.

(B) Replacements. Transformers and enclosures shall be identified for wet locations where replacements are made.

For the purposes of NEC 555.7, transformer terminations must be located a minimum of 12 inches above the deck of a dock (datum plane requirements do not apply for this section).

Informational Note: The requirements of WAC 296-46B-555(1) are incorporated herein.

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.

555.30 Electrical Equipment and Connections.

Δ **(A) General.** All electrical components within electrical equipment (excluding wiring methods) and connections not intended for operation while submerged shall be located at least 305 mm (12 in.) above the deck of a fixed or floating structure, but not below the electrical datum plane. Conductor splices, within junction boxes identified for wet locations, utilizing sealed wire connector systems listed and identified for submersion shall be required for floating structures where located above the waterline but below the electrical datum plane.

Δ **(B) Replacements.** Replacement electrical connections shall be located at least 305 mm (12 in.) above the deck of a floating or fixed structure. Conductor splices, within junction boxes identified for wet locations, utilizing sealed wire connector systems listed and identified for submersion shall be required where located above the waterline but below the electrical datum plane.

For the purposes of NEC 555.30, all electrical connections must be installed a minimum of 12 inches above the deck of a pier unless the connections are within junction boxes identified for wet locations, utilizing sealed wire connector systems listed and identified for submersion. (datum plane requirements do not apply for this section).

Informational Note: WAC 296-46B-555 (3) Electrical connections

555.31 Electrical Equipment Enclosures.

(A) Securing and Supporting. Electrical equipment enclosures installed on piers above deck level shall be securely and substantially supported by structural members, independent of any conduit connected to them. If enclosures are not attached to mounting surfaces by means of external ears or lugs, the internal screw heads shall be sealed to prevent seepage of water through mounting holes.

(B) Location. Electrical equipment enclosures on piers shall be located so as not to interfere with mooring lines. For the purposes of NEC 555.31, all enclosures must be corrosion resistant. All gasketed enclosures must be arranged with a weep hole to discharge condensation.

Informational Note: WAC 296-46B-555 (4) Electrical Equipment

555.51 Feeder Conductors. Each floating building shall be supplied by a single set of feeder conductors from its service equipment.

Exception: Where the floating building has multiple occupancy, each occupant shall be permitted to be supplied by a single set of feeder conductors extended from the occupant's service equipment to the occupant's panelboard.

Where shore power is provided, a disconnecting means must be located within sight of each floating building or similar facility. The disconnecting means must be installed adjacent to but not in or on the floating building or similar facility.

Informational Note: WAC 296-46B-555 (8) Disconnect means within sight

555.53 Ground-Fault Protection.
The main overcurrent protective device that feeds the floating building shall have ground-fault protection not exceeding ((~~100 mA~~)) 30mA. Ground-fault protection of each individual branch or feeder circuit shall be permitted as a suitable alternative. Outdoor outlets, shore power outlets, and boat hoists located at floating buildings shall comply with 555.35(B) and (C).

Informational Note: Requirements of WAC 296-46B-555(9) incorporated herein

ARTICLE 590
Temporary Installations

590.2 All Wiring Installations.

(A) Other Articles. Except as specifically modified in this article, all other requirements of this Code for permanent wiring shall apply to temporary wiring installations.

(B) Approval. Temporary wiring methods shall be acceptable only if approved based on the conditions of use and any special requirements of the temporary installation. A temporary service shall only be approved if accompanied by a building, land use, or trade permit demonstrating a need for electric power.

ARTICLE 600
Electric Signs and Outline Lighting

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 in- stalled. The retrofit kit manufacturer's installation instructions shall be made available for the inspector's use at the time of the inspection. The inspector shall be provided with an on-site means to verify the installation at the time of inspection.

Informational Note No. 1: Sign and outline lighting illumination systems include, but are not limited to, cold cathode neon tubing, high-intensity discharge lamps (HID), fluorescent or incandescent lamps, light-emitting diodes (LEDs), and electroluminescent and inductance lighting.

Informational Note No. 2: WAC 296-46B-600, requirements for electric signs and outline lighting, is incorporated herein with edits.

Informational Note No. 3: Inspections for retrofits must be scheduled at least 24 hours in advance of the work being performed.

600.2 Definitions. The definitions in this section shall apply only within this article.

Overhead Electrical Conductors. Any exterior electrical conductor, either bare or insulated, installed above the ground except those conductors enclosed in an approved raceway or enclosure. Overhead electrical conductors include but are not limited to overhead powerlines, overhead utility conductors, overhead service drops, overhead feeders, etc.

Informational Note: Also see Chapter 31 of the *Seattle Building Code* for regulation of signs and awnings.

ARTICLE 620
Elevators, Dumbwaiters, Escalators, Moving Walks, Platform Lifts, and Stairway Chairlifts

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: See ASME A17.1-2019/CSA B44:19, *Safety Code for Elevators and Escalators*, for information on the installation of elevators and escalators.

Informational Note No. 2: See CSA B44.1:19/ASME A17.5-2019, *Elevator and escalator electrical equipment*, for information on elevator and escalator electrical equipment.

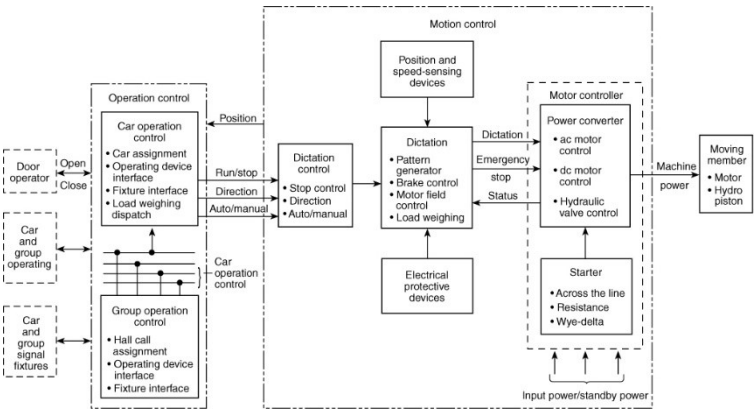
Informational Note No. 3: See ASME A18.1-2020, *Safety Standard for Platform Lifts and Stairway Chairlifts*, for information on installation of platform lifts and stairway chairlifts. The term *wheelchair lift* has been changed to platform lift.

Informational Note No. 4: The motor controller, motion controller, and operation controller are located in a single enclosure or a combination of enclosures.

Informational Note No. 5: See Informational Note Figure 620.1 for information only.

Informational Note No. 6: See Chapter 7 of the *Seattle Building Code* for requirements to pressurize elevator hoistways and elevator lobbies.

Informational Note No. 7: See Chapter 10 of the *Seattle Building Code* for requirements for elevators serving as an accessible means of egress component (in buildings that have a required accessible floor that is four or more stories above or below the level of exit discharge) and for pressurization of elevator lobbies used as an area of refuge.



Informational Note Figure 620.1 Control System.

620.5 Working Clearances.
Working space shall be provided about controllers, disconnecting means, and other electrical equipment in accordance with 110.26(A).

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)(1) shall not be required where ((~~any of~~)) the condition((~~s in~~)) of 620.5(A)(1) ((~~through (D) are~~)) is met.

(A) Flexible Connections to Equipment. Electrical equipment in the following 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 ((~~,~~)) and 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.~~))

Informational Note No. 1: For additional requirements, see Section 3020.6 of the Seattle Building Code.

Δ 620.6 Ground-Fault Circuit-Interrupter Protection for Personnel.

N **(A) Pits, Hoistways, and on Cars.** Each 125-volt, single-phase, 15- and 20-ampere receptacle installed in pits, in hoistways, on the cars of elevators and dumbwaiters, ((~~associated with wind turbine tower~~)) elevators, on the platforms or in the runways and machinery spaces of platform lifts and stairway chairlifts, and in escalator and moving walk wellways shall be a listed Class A ground-fault circuit-interrupter type.

N **(B) Machine Rooms, Control Spaces, Machinery Spaces, Control Rooms, and Truss Interiors.** All 125-volt, single-phase, 15- and 20-ampere receptacles installed in machine rooms, control spaces, machinery spaces, control rooms, and truss interiors shall have listed Class A ground-fault circuit-interrupter protection for personnel.

N **(C) Sump Pumps.** A permanently installed sump pump shall be permanently wired or shall be supplied by a receptacle that is protected by a listed Class A ground-fault circuit-interrupter.

620.21 Wiring Methods.

Conductors, cables, and optical fiber cables located in hoistways, escalator and moving walk wellways, platform lifts, stairway chairlift runways, machinery spaces, control spaces, in or on cars, machine rooms, and control rooms, not including the traveling cables connecting the car or counterweight and hoistway wiring, shall be installed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, rigid nonmetallic conduit, or wireways, or shall be Type MC, MI, or AC cable unless otherwise permitted in 620.21(A) through (C). Unused conductors in an enclosure shall be insulated or protected from accidental contact with exposed live parts.

Type AC, MC, or MI cable may be permitted to be installed in elevator spaces in lengths not exceeding six feet.

Exception: Cords and cables of listed cord-and-plug-connected equipment shall not be required to be installed in a raceway.

Informational Note: When an elevator is classified as a fire service access elevator or occupant evacuation operation elevator, some building codes require additional protection for conductors that are located outside of the elevator hoistway and machine room.

(A) Elevators.

(1) Hoistways and Pits.

(a) ((~~Types CL2P, CL2R, and CL2 cables shall be permitted, provided the cables are supported and protected from physical damage. Substitute cables for Class 2 cables installed in accordance with 722.135(E) shall be permitted.~~))Feeders shall be permitted inside the hoistway for elevators with driving machine motors located in the hoistway or on the car or counterweight.

(b) Flexible cords and cables that are components of listed equipment and used in circuits operating at 30 volts rms or less or 42 volts dc or less shall be permitted, provided the cords and cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.

(c) The following wiring methods shall be permitted in the hoistway in lengths not to exceed 1.8 m (6 ft):

(1) Flexible metal conduit.

(2) Liquidtight flexible metal conduit.

(3) ((~~Liquidtight flexible nonmetallic conduit.~~)) Reserved

(4) ((~~Flexible cords and cables, or conductors grouped together and taped or corded, shall be permitted to be installed without a raceway. They shall be located to be protected from physical damage, shall be of a flame-retardant type, and shall be part of one of the following:~~)) Reserved

((~~a. Listed equipment~~

~~b. Driving machine~~

~~c. Driving machine brake~~

~~*Exception to 620.21(A)(1)(c)(1), (A)(1)(c)(2), and (A)(1)(c)(3):*~~
~~*The conduit length shall not be required to be limited between risers and limit switches, interlocks, operating buttons, and similar devices.*~~))

(d) A sump pump or oil recovery pump located in the pit shall be permitted to be cord connected. The cord shall be a hard usage oil-resistant type, of a length not to exceed 1.8 m (6 ft), and shall be located to be protected from physical damage.

(e) ~~Hard-service cords and junior hard-service cords that conform to the requirements of Article 400 (Table 400.4) shall be permitted as flexible connections between the fixed wiring in the hoistway and hoistway access switches when located in the hoistway door sight guard.~~ Reserved.

((~~Informational Note: See ASME A17.1-2019/CSA B44-19, *Safety Code for Elevators and Escalators.*~~))

(f) 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.

(g) 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)~~)) 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 (LFNC-B) of metric designator 12 (trade size 3/8) or larger 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 top-of-car operating device or the car-top work light. Devices or luminaires shall be grounded by means of an equipment grounding conductor run with the circuit conductors. Cables with smaller conductors and other types and thicknesses of insulation and jackets shall be permitted as flexible connections between the fixed wiring on the car and devices on the car doors or gates, if listed for this use.

(c) ~~Flexible cords and cables that are components of listed equipment and used in circuits operating at 30 volts rms or less or 42 volts dc or less shall be permitted, provided the cords and cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.~~ Nonmetallic raceways and wireways shall not be installed on cars located in hoistways required to be of noncombustible fire-resistive construction.

(d) The following wiring methods shall be permitted on the car assembly in lengths not to exceed ((~~1.8 m (6 ft)~~)) 3 ft

(1) Flexible metal conduit

(2) Liquidtight flexible metal conduit

(3) Liquidtight flexible nonmetallic conduit

(4) Flexible cords and cables, or conductors grouped together and taped or corded, shall be permitted to be installed without a raceway. They shall be located to be protected from physical damage and shall be of a flame-retardant type and shall be part of one of the following:

a. Listed equipment

b. A driving machine

c. A driving machine brake

Δ (3) Within Machine Rooms, Control Rooms, and Machinery Spaces and Control Spaces.

(a) Flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit of metric designator 12 (trade size 3/8), or larger, not exceeding 1.8 m (6 ft) in length, shall be permitted between control panels and machine motors, machine brakes, motor-generator sets, disconnecting means, and pumping unit motors and valves.
~~*Exception: Liquidtight flexible nonmetallic conduit (LFNC-B) metric designator 12 (trade size 3/8) or larger 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)~~)) 3 ft that are of a flame-retardant type and located to be protected from physical damage shall be permitted in these rooms and spaces without being installed in a raceway. They shall be part of one of the following:
(1) Listed equipment

(2) A driving machine

(3) A driving machine brake

(4) Counterweight. The following wiring methods shall be permitted on the counterweight 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, shall be of a flame-retardant type, and shall be part of one of the following:

a. Listed equipment

b. A driving machine

c. A driving machine brake

(B) Escalators.

Δ **(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 (LFNC-B) shall be permitted to be installed in lengths in excess of 1.8 m (6 ft).

(2) Class 2 Circuit Cables. Types CL2P, CL2R, and CL2 cables shall be permitted to be installed within escalators and moving walkways, provided the cables are ((~~supported and protected~~)) installed in a raceway for protection from physical damage and the cables are of a jacketed and flame-retardant type. Substitute cables for Class 2 cables installed in accordance with 722.135(E) shall be permitted.

(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 (LFNC-B) shall be permitted to be installed in lengths in excess of 1.8 m (6 ft).

(2) Class 2 Circuit Cables. Types CL2P, CL2R, and CL2 traveling cables 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. Substitute cables for Class 2 cables installed in accordance with 722.135(E) shall be permitted.

(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 Panelboards. All branch circuits required by 620.22, 620.23, and 620.25 shall originate from a panelboard in the elevator machine room or control room. The panelboard enclosure may have a door with a latch, but the enclosure door cannot be lockable.

Exception 1: A separate branch circuit for pit lighting and receptacle shall be allowed in accordance with 620.24 from other than in the elevator machine room or control room.

Exception 2: Private residence elevators are exempt from this ordinance.

620.27 Prohibited Equipment in Elevator Machine Room or Control Room.
Any electrical equipment on the line side of the panelboard required in 620.26, including a main breaker in the panelboard, or elevator disconnecting means, shall be prohibited in the elevator machine room or the control room.

Exception: Transformers 30 kva or less, and their associated secondary conductor overcurrent protection/disconnects, supplying associated elevator or machine/control room loads, subject to the following:

1. *Required elevator machine/control room electrical clearances shall be maintained.*
2. *The added heat load of the transformer shall be considered for machine/control room heating and cooling and ventilation. The BTUs of the transformer and the elevator equipment manufacturer shall be included in the HVAC calculation for the elevator machine/control room to ensure safe and normal operation of the elevator.*
3. *The heat output of the transformer in BTUs shall be posted in a visible location on the transformer.*

620.44 Installation of Traveling Cables.
Traveling cables that are suitably supported and protected from physical damage shall be permitted to be run without the use of a raceway in either or both of the following:

(1) When used inside the hoistway, on the elevator car, hoistway wall, counterweight, or controllers and machinery that are located inside the hoistway, provided the cables are in the original sheath.

(2) From inside the hoistway, to elevator controller enclosures and to elevator car and machine room, control room, machinery space, and control space connections that are located outside the hoistway for a distance not

exceeding 1.8 m (6 ft) in length as measured from the first point of support on the elevator car or hoistway wall, or counterweight where applicable, provided the conductors are ((~~grouped together and taped or corded, or~~)) in the original sheath. These traveling cables shall be permitted to be continued to this equipment.

620.51 Disconnecting Means.
A single means for disconnecting all ungrounded main power supply conductors for each elevator, dumbwaiter, escalator, moving walk, platform lift, or stairway chairlift shall be provided and be designed so that no pole can be operated independently. Where multiple driving machines are connected to a single elevator, escalator, moving walk, or pumping unit, there shall be one disconnecting means to disconnect the motor(s) and control valve operating magnets.

The disconnecting means for the main power supply conductors shall not disconnect the branch circuits required in 620.22, 620.23, and 620.24.

(A) Type. The disconnecting means shall be an enclosed externally operable fused motor circuit switch or circuit breaker that is lockable only in the open position in accordance with 110.25. If circuit breaker type disconnect is used, it shall not have a door or cover over the breaker. The disconnecting means shall be a listed device.

Informational Note No. 1: See ASME A17.1-2019/CSA B44-19, *Safety Code for Elevators and Escalators*, for additional information.

Informational Note No. 2: See ASME A18.1-2017, *Safety Standard for Platform Lifts and Stairway Chairlifts*, for additional information.

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 a((~~n individual~~)) branch circuit supplies a stairway chairlift or where a stairway chairlift is supplied by batteries as the primary source, 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.

Informational Note: See Seattle Building Code 3020.6 for specific location requirements of disconnects

(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) Available Fault Current Field Marking. The disconnecting means shall be legibly marked in the field with the available fault current at its line terminals. The field marking(s) shall include the date the available fault current calculation was performed and be of sufficient durability to withstand the environment involved.
When modifications to the electrical installation occur that affect the available fault current at the disconnecting means, the available fault current shall be verified or recalculated as necessary to ensure the elevator equipment's short-circuit current rating is sufficient for the available fault current at the line terminals of the equipment. The required field marking(s) shall be adjusted to reflect the new level of available fault current.

(E) Surge Protection. Where any of the disconnecting means in 620.51 has been designated as supplying an emergency system load, a legally required system load, or a critical operation power system load, a listed SPD shall be installed.

(F) Automatic Power Disconnect Device Control Circuit (Where Provided). 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.

620.53 Car Light, Receptacle(s), and Ventilation Disconnecting Means.
Elevators shall have a single means for disconnecting all ungrounded car light, receptacle(s), and ventilation power-supply conductors for that elevator car.

The disconnecting means shall be an enclosed, externally operable, fused motor-circuit switch or circuit breaker that is lockable open in accordance with 110.25 and shall be located in the machine room or control room for that elevator car. ((~~Where there is no machine room or control room outside the hoistway, the disconnecting means shall be located outside the hoistway and accessible to qualified persons only.~~))

Disconnecting means shall be numbered to correspond to the identifying number of the elevator car whose light source they control.

The disconnecting means shall be provided with a sign to identify the location of the supply side overcurrent protective device.

Exception: Where a separate branch circuit supplies car lighting, a receptacle(s), and a ventilation motor not exceeding 2 hp, the disconnecting means required by 620.53 shall be permitted to comply with 430.109(C). This disconnecting means shall be listed and shall be lockable open in accordance with 110.25.

620.62 Selective Coordination.
Where more than one driving machine disconnecting means is supplied by the same source, the overcurrent protective devices in each disconnecting means shall be selectively coordinated with any other supply-side overcurrent protective devices.

Selective coordination shall be selected by a licensed professional engineer or other qualified person engaged primarily in the design, installation, or maintenance of electrical systems. The selection and device settings shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

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

Exception No. 2: When an electrical engineer provides stamped fault current calculations, the overcurrent protective devices in each disconnecting means may be selectively coordinated with any other supply side overcurrent protective devices for faults with a duration of 0.1 seconds and longer.

Exception 3: When an electrical engineer provides stamped fault current calculations, the overcurrent protective de- vices 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.

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.

Non-elevator equipment, wiring, pipes, and other materials are prohibited in elevator hoistways, pits, machine rooms and control rooms. Only such equipment and wiring that pertain directly to the elevator and its operation are permitted in these spaces. See Chapter 30 of the *Seattle Building Code*.

Exception: Elevator motor controllers may be installed, with permission of the authority having jurisdiction, in a hoistway.

(A) Motor Controllers. ~~((Motor controllers shall be permitted outside the spaces herein specified, provided they are in enclosures with doors or removable panels that are capable of being locked in the closed position and the disconnecting means is located adjacent to or is an integral part of the motor controller.))~~ Motor controller enclosures for escalator or moving walks shall be permitted in the balustrade on the side located away from the moving steps or moving treadway. If the disconnecting means is an integral part of the motor controller, it shall be operable without opening the enclosure.

(B) Driving Machines. Elevators with driving machines located on the car, on the counterweight, or in the hoistway, and driving machines for dumbwaiters, platform lifts, and stairway lifts, shall be permitted outside the spaces herein specified.

620.91 Emergency and Standby Power Systems.
((~~Elevators shall be permitted to be powered by an emergency or standby power system.~~)) Elevator power system requirements are determined by the Seattle Building Code.

Informational Note No. 1: See ASME A17.1-2016/CSA B44-16, Safety Code for Elevators and Escalators, 2.27.2, for additional information.

Informational Note No. 2: When an elevator is classified as a fire service access elevator or occupant evacuation operation elevator, ((~~some building codes require~~)) the elevator equipment, elevator hoistway lighting, ventilation and cooling equipment for elevator machine rooms, control rooms, machine spaces and control spaces ((~~as well as~~)), elevator car lighting, as well as elevator pit sump pumps ((~~to~~)) should be supplied by emergency or standby power systems ((~~in compliance with Article 701~~)) as required by the *Seattle Building Code*.

Informational Note No. 3: See Chapter 7 of the Seattle Building Code for requirements to pressurize elevator hoistways and elevator lobbies.

Informational Note No. 4: 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 conditions, a means shall load be provided to absorb this power.

(B) Other Building Loads. Other building loads, such as power and lighting, shall be permitted as the energy absorption means required in 620.91(A), provided that such loads are automatically connected to the emergency or standby power system operating the elevators and are large enough to absorb the elevator regenerative power.

(C) Disconnecting Means. The disconnecting means required by 620.51 shall disconnect the elevator from both the emergency or standby power system and the normal power system.
Where an additional power source is connected to the load side of the disconnecting means, which allows automatic movement of the car to permit evacuation of passengers, the disconnecting means required in 620.51 shall be provided with an auxiliary contact that is positively opened mechanically, and the opening shall not be solely dependent on springs. This contact shall cause the additional power source to be disconnected from its load when the disconnecting means is in the open position.

ARTICLE 625
Electric Vehicle Charging System

625.27 Requirements for Electrical Vehicle Charging Outlets. New parking spaces provided on a lot when a new building is constructed shall be "EV-ready" as specified in 625.27 (A), (B) or (C). Calculating the number of required EV-ready parking spaces is based on the percentage of occupancy type, any fraction or portion of an EV-ready parking space required shall be rounded up to the nearest whole number.

Exception: The Director may, in consultation with the Director of Seattle City Light, reduce the requirements of this section where there is substantial evidence substantiating that the added electrical load that can be attributed to meeting these requirements will alter the local utility infrastructure design requirements on the utility side of the legal point of service, so as to require on-property power transformation; or require an upgrade to an existing residential electrical service. In these cases, the maximum quantity of EV charging infrastructure required to be installed shall be reduced to the maximum service size that would not require changes to transformation or existing electrical service capacity. The Director may first reduce the required level of EV infrastructure at EV-ready parking spaces from 40-amp to 20-amp circuits. If necessary, the Director may also then reduce the number of required EV-ready parking spaces or otherwise reduce the level of EV infrastructure at EV-ready parking spaces.

(A) Residential uses.

(1) When parking for one- or two-family dwellings is provided in a private garage, carport, or surface parking area, separate from any parking facilities serving other units, at least one parking space for each dwelling unit in that garage, carport, or parking area shall be EV-ready.

(2) When parking for multifamily residential uses is provided in a surface parking area serving multiple residences, the number of parking spaces that shall be EV-ready shall be as follows:

a. For up to 25 required parking spaces, the first 12 shall be EV-ready.

b. When more than 25 parking spaces are provided, 45 percent of all parking spaces shall be EV-ready

(3) When parking for multifamily residential uses is provided in a parking garage serving multiple residences, a minimum of 45 percent of those parking spaces shall be EV-ready.

(B) Nonresidential uses. When parking is provided for nonresidential uses, a minimum of 30 percent of those spaces shall be EV-ready.

Exception: For non-residential occupancies with less than 10 on-site parking spaces, or Group A, E, and M occupancies, at least 10 percent of parking spaces shall be EV-Ready.

(C) Electric vehicle charging infrastructure for accessible parking spaces. Where accessible parking spaces are required, 20 percent of the accessible parking spaces, rounded to the next whole number, shall be EV Ready with no fewer than two EV Ready spaces.

The accessible parking EV Ready infrastructure may also serve adjacent parking spaces not designated as accessible parking. The EV ready accessible parking spaces, rounded to the next whole number, are allowed to be included in the total number of electric vehicle parking spaces required under 625.27(A) &(B).

(D) Electrical room(s) and equipment. Electrical room(s) and electrical equipment shall be sized to accommodate the requirements of Section 625.27. The electrical service and on-site distribution, including transformer(s), shall have sufficient capacity to simultaneously charge all EV's at all EV Ready parking spaces, at a minimum of 208/240 Volt, 40-amperes each (32 amp output).

Exception: An energy management system (EMS) may be used to adjust the maximum electrical capacity required for the EV-Ready parking spaces. The EMS must be designed to allocate charging capacity among multiple future EV charging stations at a minimum of 16 amperes per EV charger.

Informational Note: Automatic load management systems (ALMS) is a term often used to describe energy management systems (EMS).

625.43 Disconnecting means.

((~~For~~)) EVSE and WPTE ((~~rated more than 60 amperes or more than 150 volts to ground, the~~)) disconnecting means shall be labeled as "EV Charger Disconnect" ((~~, provided~~)) and installed in a readily accessible location((~~. If the disconnecting means is installed remote from the ,~~)) in sight and within 25 feet of the EVSE or WPTE equipment. ((~~, a plaque shall be installed on the equipment denoting the location of the disconnecting means. The disconnecting means shall be lockable open in accordance with 110.25.~~))

ARTICLE 645
Information Technology Equipment

645.27 Selective Coordination.
Critical operations data system(s) overcurrent protective devices shall be selectively coordinated with all supply-side overcurrent protective devices.

Selective coordination shall be selected by a licensed professional engineer or other qualified persons engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

Exception: When an electrical engineer provides stamped fault current calculations, the overcurrent protective devices in each disconnecting means may be selectively coordinated with any other supply side overcurrent protective devices for faults with a duration of 0.1 seconds and longer.

ARTICLE 680
Swimming Pools, Fountains, and Similar Installations

680.73 Accessibility.
Hydromassage bathtub electrical equipment shall be accessible without damaging the building structure or building finish. Where the hydromassage bathtub is cord- and plug-connected with the supply receptacle accessible only through a service access opening, the receptacle shall be installed so that its face is within direct view and not more than 300 mm (1 ft) of the opening.

The ground fault circuit interrupter device must be identified as to use and not located in a building or tub cavity, crawlspace, or attic.

All electrical equipment installed to support the bathtub (e.g., disconnecting means, motor, etc.) must be accessible at the same grade level as the tub or from a landing on the exterior of the building without the use of a ladder or other access device.

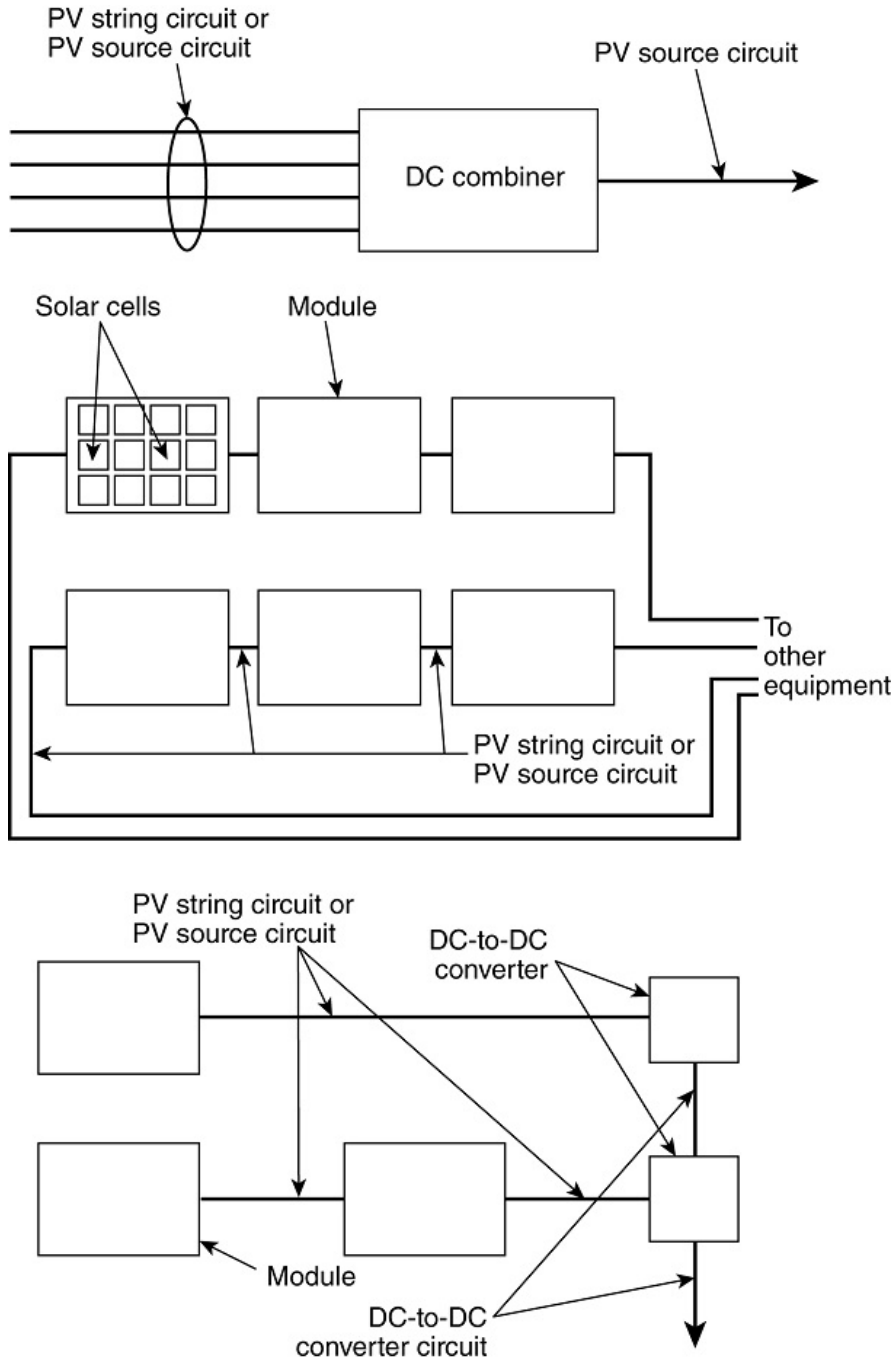
Informational Note: WAC 296-46B-680, requirements for special equipment such as swimming pools, fountains, and similar installations, is incorporated herein with edits.

ARTICLE 690
Solar Photovoltaic (PV) Systems

Δ 690.1 Scope.
This article applies to solar PV systems, other than those covered by Article 691, including the array circuit(s), inverter(s), and controller(s) for such systems. The systems covered by this article include those interactive with other electric power production sources or stand-alone, or both. These PV systems may have ac or dc output for utilization.

Informational Note No. 1 ((~~See Informational Note Figure 690.1~~)). *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.



Informational Note Figure 690.1 Illustration of PV System DC Circuits and PV System Components in a Typical PV Installation.

690.13 Photovoltaic System Disconnecting Means.
Means shall be provided to disconnect the PV system from all wiring systems including power systems, energy storage systems, and utilization equipment and its associated premises wiring.
Δ **(A) Location.**

N **(1) Readily Accessible.** The PV system disconnecting means shall be installed at a readily accessible location.

N **(2) Enclosure Doors and Covers.** Where a disconnecting means for circuits operating above 30 volts is readily accessible to unqualified persons, an enclosure door or hinged cover that exposes energized parts when open shall have its door or cover locked or require a tool to be opened.

(B) Marking. Each PV system disconnecting means shall plainly indicate whether in the open (off) or closed (on) position and be permanently marked "PV SYSTEM DISCONNECT" or equivalent. Additional markings shall be permitted based upon the specific system configuration. For PV system disconnecting means where the line and load terminals may be energized in the open position, the device shall be marked with the following words or equivalent:

WARNING

ELECTRIC SHOCK HAZARD TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

The warning sign(s) or label(s) shall comply with 110.21(B).

Δ (C) Maximum Number of Disconnects. Each PV system disconnecting means shall consist of not more than six switches or six sets of circuit breakers, or a combination of not more than six switches and sets of circuit breakers, mounted in a single enclosure, or in a group of separate enclosures. A single PV system disconnecting means shall be permitted for the combined ac output of one or more inverters or ac modules.

Informational Note: This requirement does not limit the number of PV systems connected to a service as permitted in 690.4(D). This requirement allows up to six disconnecting means to disconnect a single PV system. For PV systems where all power is converted through interactive inverters, a dedicated circuit breaker, in 705.12(B)(1), is an example of a single PV system disconnecting means.

(D) Ratings. The PV system disconnecting means shall have ratings sufficient for the maximum circuit current, available fault current, and voltage that is available at the terminals of the PV system disconnect.

(E) Type of Disconnect. The PV system disconnecting means shall simultaneously disconnect the PV system conductors that are not solidly grounded from all conductors of other wiring systems. The PV system disconnecting means or its remote operating device or the enclosure providing access to the disconnecting means shall be capable of being locked in accordance with 110.25. The PV system disconnecting means shall be one of the following:

(1) A manually operable switch or circuit breaker

(2) A connector meeting the requirements of 690.33(D)(1) or (D)(3)

(3) A pull-out switch with the required interrupting rating

(4) A remote-controlled switch or circuit breaker that is operable locally and opens automatically when control power is interrupted

(5) A device listed or approved for the intended application

Informational Note: Circuit breakers marked "line" and "load" may not be suitable for backfeed or reverse current.

Where the PV system is interactive with other electric power production source(s), and the disconnect is a knife switch, then the PV system disconnect shall comply with the requirements of 404.13(E) and 705.20.

ARTICLE 695
Fire Pumps

Δ 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 NFPA 20-2019, *Standard for the Installation of Stationary Pumps for Fire Protection,* 9.3.2 and A.9.3.2, 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)]

Informational Note: See NFPA 20-2019, Standard for the Installation of Stationary Pumps for Fire Protection, 9.2.2, for more information on normal power sources. Subsection 9.2.2(3) permits a “dedicated feeder” to be derived from a “dedicated service” disconnecting means. Subsection 9.2.2(5) permits a “dedicated transformer connection” that is supplied directly from a “dedicated service disconnecting means” where the service is not at utilization voltage.

(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 695.3(B)(1) and (B)(2): An alternate source of power shall not be required where a back-up engine-driven fire pump, back-up steam turbine-driven fire pump, or back-up electric motor-driven fire pump with an independent power source in accordance with 695.3(A) or (C) is installed.

(C) Multibuilding Campus-Style Complexes. If the sources in 695.3(A) are not practicable and the installation is part of a multibuilding campus-style complex, feeder sources shall be permitted if approved by the authority having jurisdiction and installed in accordance with either 695.3(C)(1) and (C)(3) or (C)(2) and (C)(3).

(1) Feeder Sources. Two or more feeders shall be permitted as more than one power source if such feeders are connected to, or derived from, separate utility services. The connection(s), overcurrent protective device(s), and disconnecting means for such feeders shall meet the requirements of 695.4(B)(1)(b).

Δ (2) Feeder and Alternate Source. A feeder shall be permitted as a normal power source if an alternate power source 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. Overcurrent protective device(s) shall be selectively coordinated with all supply-side overcurrent protective device(s).

Selective coordination shall be selected by a licensed professional engineer or other qualified persons engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those authorized to design, install, maintain, and operate the system.

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

Exception 2: When an electrical engineer provides stamped fault current calculations, the overcurrent protective devices in each disconnecting means may be selectively coordinated with any other supply side overcurrent protective devices for faults with a duration of 0.1 seconds and longer.

(D) On-Site Standby Generator as Alternate Source. An on-site standby generator(s) used as an alternate source of power shall comply with **695.3(D)(1)** through (D)(3). [**20:**9.6.2.1]

(1) Capacity. The generator shall have sufficient capacity to allow normal starting and running of the motor(s) driving the fire pump(s) while supplying all other simultaneously operated load(s). [**20:**9.6.1.1]

Automatic shedding of one or more optional standby loads in order to comply with this capacity requirement shall be permitted.

(2) Connection. A tap ahead of the generator disconnecting means shall not be required. [**20:**9.6.1.2]

(3) Adjacent Disconnects. The requirements of 430.113 shall not apply.

(E) Arrangement. All power supplies shall be located and arranged to protect against damage by fire from within the premises and exposing hazards. [**20:**9.1.4]
Multiple power sources shall be arranged so that a fire at one source does not cause an interruption at the other source.

(F) Transfer of Power. Transfer of power to the fire pump controller between the individual source and one alternate source shall take place within the pump room. [**20:**9.6.4]

(G) Power Source Selection. Selection of power source shall be performed by a transfer switch listed for fire pump service. [20:10.8.1.3.1]

(H) Overcurrent Device Selection. An instantaneous trip circuit breaker shall be permitted in lieu of the overcurrent devices specified in 695.4(B)(2)(a)(1), provided that it is part of a transfer switch assembly listed for fire pump service that complies with 695.4(B)(2)(a)(2).

(I) Phase Converters. Phase converters shall not be used to supply power to a fire pump. [20:9.1.7]

ARTICLE 700
Emergency Systems

Δ 700.1 Scope.
This article applies to the electrical safety of the installation, operation, and maintenance of emergency systems consisting of circuits and equipment intended to supply, distribute, and control electricity for illumination, power, or both, to required facilities when the normal electrical supply or system is interrupted.

Informational Note No. 1: Emergency systems are generally installed in places of assembly where artificial illumination is required for safe exiting and for panic control in buildings subject to occupancy by large numbers of persons, such as hotels, theaters, sports arenas, health care facilities, and similar institutions. Emergency systems may also provide power for such functions as ventilation where essential to maintain life, fire detection and alarm systems, elevators, fire pumps, public safety communications systems, industrial processes where current interruption would produce serious life safety or health hazards, and similar functions.

Informational Note No. 2: See Article 517, Health Care Facilities, for further information regarding wiring and installation of emergency systems in health care facilities.

Informational Note No. 3: See NFPA 99-2018, Health Care Facilities Code, for further information regarding performance and maintenance of emergency systems in health care facilities.

Informational Note No. 4: See NFPA 101-2018, Life Safety Code, for specification of locations where emergency lighting is considered essential to life safety.

Informational Note No. 5: See NFPA 110-2019, Standard for Emergency and Standby Power Systems, and NFPA 111-2019, Standard on Stored Electrical Energy Emergency and Standby Power Systems, for further information regarding performance of emergency and standby power systems. Emergency systems are considered Level 1 systems when applying NFPA 110.

Informational Note No. 6: 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. 7: See Chapter 10 of the Seattle Building Code for means of egress illumination and identification requirements.

Informational Note No. 8: See SDCI TIP 339, Emergency and Standby Power Systems, for additional information

700.3 Tests and Maintenance.
(A) Commissioning Witness Test. The authority having jurisdiction shall conduct or witness the commissioning of the complete system upon installation and periodically afterward.

Informational Note: See NECA 90, *Standard for Commissioning Building Electrical Systems*

(B) Tested Periodically. Systems shall be tested periodically on a schedule approved by the authority having jurisdiction to ensure the systems are maintained in proper operating condition.

(C) Maintenance. Emergency system equipment shall be maintained in accordance with manufacturer instructions and industry standards.

(D) Written Record. A written record shall be kept of such tests and maintenance.

(E) Testing Under Load. Means for testing all emergency lighting and power systems during maximum anticipated load conditions shall be provided.

Informational Note: See NFPA 110-2019, *Standard for Emergency and Standby Power Systems*, for information on testing and maintenance of emergency power supply systems (EPSSs).

Δ **(F) Temporary Source of Power for Maintenance or Repair of the Alternate Source of Power.** If the emergency system relies on a single alternate source of power, which will be disabled for maintenance or repair, the emergency system shall include permanent switching means to connect a portable or temporary alternate source of power, which shall be available for the duration of the maintenance or repair. The permanent switching means to connect a portable or temporary alternate source of power shall comply with the following:

(1) Connection to the portable or temporary alternate source of power shall not require modification of the permanent system wiring.

(2) Transfer of power between the normal power source and the emergency power source shall be in accordance with 700.12.

(3) The connection point for the portable or temporary alternate source shall be marked with the phase rotation and system bonding requirements.

(4) The switching means, including the interlocks, shall be listed and provided with mechanical or mechanical and electrical interlocking to prevent inadvertent interconnection of power sources.

(5) The switching means shall include a contact point that shall annunciate at a location remote from the generator or at another facility monitoring system to indicate that the permanent emergency source is disconnected from the emergency system.

(6) The permanent connection point for the temporary generator shall be located outdoors and shall not have cables from the connection point to the temporary generator routed through exterior windows, doors, or similar openings.

(7) A permanent label shall be field applied at the permanent connection point to identify the system voltage, maximum amperage, short-circuit current rating of the load side of equipment supplied, and ungrounded conductor identification in accordance with 210.5.

(8) A disconnecting means shall be provided for conductors from where they enter the building to the emergency system. See Section 225.31(B) for location information.

It shall be permissible to use manual switching to switch from the permanent source of power to the portable or temporary alternate source of power and to use the switching means for connection of a load bank.

Informational Note: See Informational Note Figure 700.3(F) for one example of many possible methods to achieve the requirements of 700.3(F).

Exception: The permanent switching means to connect a portable or temporary alternate source of power, for the duration of the maintenance or repair, shall not be required where any of the following conditions exists:

(1) *All processes that rely on the emergency system source are capable of being disabled during maintenance or repair of the emergency source of power.*

(2) *The building or structure is unoccupied and fire protection systems are fully functional and do not require an alternate power source.*

(3) *Other temporary means can be substituted for the emergency system.*

(4) *A permanent alternate emergency source, such as, but not limited to, a second on-site standby generator or separate electric utility service connection, capable of supporting the emergency system, exists.*

700.7 Signs.

(A) Emergency Sources. A sign shall be placed at the service-entrance equipment, indicating type and location of each on-site emergency power source.

Sign(s) must be placed at the service disconnecting means and the meter base if the services disconnecting means and meter base are not located within sight and within 5 ft of each other.

Exception: A sign shall not be required for individual unit equipment as specified in 700.12(H).

Informational Note: WAC 296-46B-700.007(2), requirements for sign placement, is incorporated herein.

(B) Grounding. Where removal of a grounding or bonding connection in normal power source equipment interrupts the grounding electrode conductor connection to the alternate power source(s) grounded conductor, a warning sign shall be installed at the normal power source equipment stating:

WARNING
SHOCK HAZARD EXISTS IF GROUNDING
ELECTRODE CONDUCTOR OR BONDING
JUMPER CONNECTION IN THIS EQUIPMENT IS
REMOVED WHILE ALTERNATE SOURCE(S) IS
ENERGIZED.

The warning sign(s) or label(s) shall comply with 110.21(B).

700.10 Wiring, Emergency System.

(A) Identification. ((~~Emergency circuits shall be permanently marked so they will be readily identified as a component of an emergency circuit or system by the following methods:~~)) All exit and emergency lights, whether or not required by this *Code*, must be installed in accordance with Article 700.

(1) ((~~All boxes and enclosures (including transfer switches, generators, and power panels) for emergency circuits shall be permanently marked as a component of an emergency circuit or system so they will be readily identified as a component of an emergency circuit or system.~~)) All boxes and enclosures, for Article 700 systems, larger than 6 in. by 6 in., including transfer switches, generators, and power panels for emergency systems and circuits, must be permanently identified *with* an identification plate that is substantially orange in color. All other device and junction boxes for emergency systems and circuits must be substantially orange in color, both inside and outside.

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.

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.

Δ **(B) Wiring.** Wiring from an emergency source or emergency source distribution overcurrent protection to emergency loads shall be kept entirely independent of all other wiring and equipment unless otherwise permitted in the following:

(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 within a traveling cable to an elevator

(6) Wiring from an emergency source to supply emergency and other (nonemergency) loads in accordance with the following:

a. Separate vertical switchgear sections or separate vertical switchboard sections, with or without a common bus, or individual disconnects mounted in separate enclosures shall be used to separate emergency loads from all other loads.

b. The common bus of separate sections of the switchgear, separate sections of the switchboard, or the individual enclosures shall be either of the following:

(i) Supplied by single or multiple feeders without overcurrent protection at the source

(ii) Supplied by single or multiple feeders with overcurrent protection, provided that the overcurrent protection that is common to an emergency system and any nonemergency system(s) is selectively coordinated with the next downstream overcurrent protective device in the nonemergency system(s)

Informational Note: See Informational Note Figure 700.10(B)(1) and Informational Note Figure 700.10(B)(2) in the NEC for further information.

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 use 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.

e. At the emergency power source, such as a generator, multiple integral overcurrent protective devices shall each be permitted to supply a designated emergency or a designated nonemergency load, provided that there is complete separation between emergency and nonemergency loads beginning immediately after the overcurrent protective device line-side connections.

Wiring of two or more emergency circuits supplied from the same source shall be permitted in the same raceway, cable, box, or cabinet.

(C) Wiring Design and Location. Emergency wiring circuits shall be designed and located so as to minimize the hazards that might cause failure due to flooding, fire, icing, vandalism, and other adverse conditions.

(D) Fire Protection.

(1) Occupancies. Emergency systems shall meet the additional requirements in 700.10(D)(2) through (D)(4) in the following occupancies:

(1) Assembly occupancies for not less than 1000 persons

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

(3) Educational occupancies with more than 300 occupants

Δ (2) Feeder-Circuit Wiring. Feeder-circuit wiring shall meet one of the following conditions:

(1) The cable or raceway is installed in spaces or areas that are fully protected by an approved automatic fire protection system.

Informational Note: In buildings having *Seattle Building Code* Type I or II construction, wiring located above fire protection sprinklers, including wiring separated from fire protection sprinklers by a suspended ceiling system with removable panels, 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: See UL 1724, Fire Tests for Electrical Circuit Protection Systems, for one method of defining an electrical circuit protective system. The UL Guide Information for Electrical Circuit Integrity Systems (FHIT) contains information to identify the system and its installation limitations to maintain a minimum 2-hour fire-resistive rating and is available from the certification body.

(3) The cable or raceway is a listed fire-resistive cable system with a minimum 2-hour fire rating.

(4) Informational Note No. 2: See UL 2196-2017, *Standard for Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables*, for one method of defining a fire-resistive cable system.

(5) 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.

(6) The cable or raceway is encased in a minimum of 50 mm (2 in.) of concrete.

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

(4) Source Control Wiring. Control conductors installed between the emergency power supply system/stored-energy power supply system (EPSS/SEPSS) and transfer equipment or control systems that initiate the operation of emergency sources or initiate the automatic connection to emergency loads shall be kept entirely independent of all other wiring and shall meet the conditions of 700.10(D)(2). The integrity of source control wiring shall be monitored for broken, disconnected, or shorted wires. Loss of integrity shall result in the following actions:

(1) *Generators*. Shall start the generator(s).

(2) *All other sources*. Shall be considered a system malfunction and initiate the designated signal(s) in 700.6(A).

***N* 700.11 Wiring, Class-2-Powered Emergency Lighting Systems.**

***N* (A) General.** Line voltage supply wiring and installation of Class 2 emergency lighting control devices shall comply with 700.10. Class 2 emergency circuits shall comply with 700.11(B) through (D).

***N* (B) 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:

(1) All boxes and enclosures for Class 2 emergency circuits larger than 6 in. by 6 in. shall be permanently ((~~marked as a component of an emergency circuit or system so they will be readily~~)) identified with an identification plate

that is substantially orange in color. All other device and junction boxes for emergency systems and circuits must be substantially orange in color, both inside and outside.

(2) Exposed cable, cable tray, or raceway systems shall be permanently marked to be identified as a component of an emergency circuit or system, within 900 mm (3 ft) of each connector and at intervals not to exceed 7.6 m (25 ft).

N **(C) Separation of Circuits.** Class 2 emergency circuits shall be wired in a listed, jacketed cable or with one of the wiring methods of Chapter 3. If installed alongside nonemergency Class 2 circuits that are bundled, Class 2 emergency circuits shall be bundled separately. If installed alongside nonemergency Class 2 circuits that are not bundled, Class 2 emergency circuits shall be separated by a nonconductive sleeve or nonconductive barrier from all other Class 2 circuits. Separation from other circuits shall comply with 725.136.

N **(D) Protection.** Wiring shall comply with the requirements of 300.4 and be installed in a raceway, armored or metal-clad cable, or cable tray.

Exception No. 1: Section 700.11(D) shall not apply to wiring that does not exceed 1.83 m (6 ft) in length and that terminates at an emergency luminaire or an emergency lighting control device.

Exception No. 2: Section 700.11(D) shall not apply to locked rooms or locked enclosures that are accessible only to qualified persons.

Informational Note: Locked rooms accessible only to qualified persons include locked telecommunications rooms, locked electrical equipment rooms, or other access-controlled areas.

700.12 General Requirements.
Current supply shall be such that, in the event of failure of the normal supply to, or within, the building or group of buildings concerned, emergency lighting, emergency power, or both shall be available within the time required for the application but not to exceed 10 seconds. The supply system for emergency purposes, in addition to the normal services to the building and meeting the general requirements of this section, shall be one or more of the types of systems described in 700.12(C) through (H). Unit equipment in accordance with 700.12(H) shall satisfy the applicable requirements of this article.

(A) Power Source Considerations. In selecting an emergency source of power, consideration shall be given to the occupancy and the type of service to be rendered, whether of minimum duration, as for evacuation of a theater, or longer duration, as for supplying emergency power and lighting due to an indefinite period of current failure from trouble either inside or outside the building.

Δ (B) Equipment Design and Location. Equipment shall be designed and located so as to minimize the hazards that might cause complete failure due to flooding, fires, icing, and vandalism.
Equipment for sources of power as described in 700.12(C) through (H) shall be installed either in spaces fully protected by approved automatic fire protection systems or in spaces with a 2-hour fire rating where located within the following:

(1) Assembly occupancies for more than 1000 persons

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

(3) Educational occupancies with more than 300 occupants

Informational Note No. 1: ((~~See NFPA 101-2021, Life Safety Code, Section 6.1, for information on occupancy classifications.~~)) For the definition of *Occupancy Classification*, see Chapter 3 of the *Seattle Building Code*.

Informational Note No. 2: See IEEE 3006.5-2014, Recommended Practice for the Use of Probability Methods for Conducting a Reliability Analysis of Industrial and Commercial Power Systems, for information regarding power system reliability.

Δ (C) Supply Duration. The emergency power source shall be of suitable rating and capacity to supply and maintain the total load for the duration determined by the system design. In no case shall the duration be less than 2 hours of system operation unless used for emergency illumination in 700.12(C)(4) or unit equipment in 700.12(H). Additionally, the power source shall comply with 700.12(C)(1) through (C)(5) as applicable.

Informational Note: See NFPA 110-2022, Standard for Emergency and Standby Power Systems, for information on classification of emergency power supply systems (EPSS).

N **(1) On-Site Fuel Supply.** An on-site fuel supply shall be provided, sufficient for not less than 2 hours operation of the system.

N **(2) Fuel Transfer Pumps.** Where power is needed for the operation of the fuel transfer pumps to deliver fuel to the source, these pumps shall be connected to the emergency power system.

N **(3) Public Gas System, Municipal Water Supply.** Sources shall not be solely dependent on a public utility gas system for their fuel supply or municipal water supply for their cooling systems.

((~~Exception: Where approved by the authority having jurisdiction, the use of other than on-site fuels shall be permitted where there is a low probability of a simultaneous failure of both the off-site fuel delivery system and power from the outside electrical utility company. Where the public gas system is approved, the requirements of 700.12(C)(1) shall not apply.~~))

N **(4) Storage Batteries and UPS.** Storage batteries and UPS used to supply emergency illumination 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 nominal voltage. Automotive-type batteries shall not be used. An automatic battery charging means shall be provided.

N **(5) Automatic Fuel Transfer**. Where dual fuel sources are used, means shall be provided for automatically transferring from one fuel source to another.

(D) Generator Set.

(1) Prime Mover-Driven. For a generator set driven by a prime mover approved by the authority having jurisdiction and sized in accordance with 700.4, means shall be provided for automatically starting the prime mover on failure of the normal power source and for automatic transfer and operation of all required electrical circuits. A time-delay feature shall be provided to avoid retransfer in case of short-time reestablishment of the normal source.

(2) 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.

(3) 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.

(4) 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.

Δ **(E) Stored-Energy Power Supply Systems (SEPSS).** Stored energy power supply systems shall comply with 700.12(E)(1) and (E)(2) and shall be listed for emergency use.

N **(1) Types.** Systems shall consist of one or more of the following system types:

(1) Uninterruptible power supply (UPS)

Informational Note: See UL 1778, Uninterruptible Power Systems and UL 924 *Emergency Lighting and Power Equipment*, for further information.

(2) Fuel cell system

(3) Energy storage system (ESS)

(4) Storage battery

(5) Other approved equivalent stored energy sources that comply with 700.12

N **(2) Fire Protection, Suppression, Ventilation, and Separation.** The systems in 700.12(E)(1) shall be installed with the fire protection, suppression, ventilation, and separation requirements specified in the manufacturer's instructions or equipment listing.

Informational Note: See NFPA 853-2020, Standard for the Installation of Stationary Fuel Cell Power Systems, and NFPA 855-2020, Standard for the Installation of Stationary Energy Storage Systems, for additional information on fire protection installation requirements.

(F) Separate Service. Where approved by the authority having jurisdiction as suitable for use as an emergency source of power, an additional service shall be permitted. This service shall be in accordance with the applicable provisions of Article 230 and the following additional requirements:

(1) Separate ((~~overhead service conductors,~~)) service drops, underground service conductors, or service laterals shall be installed.

(2) The service conductors for the separate service shall be installed sufficiently remote electrically and physically from any other service conductors to minimize the possibility of simultaneous interruption of supply.

Δ (G) Microgrid Systems. On-site sources, designated as emergency sources, shall be permitted to be connected to a microgrid system.

The system shall isolate the emergency system from all nonemergency loads when the normal electric supply is interrupted or shall meet the requirements of 700.4(B). Interruption or partial or complete failure of the normal or nonemergency source(s) shall not impact the availability, capacity, and duration provided by the designated emergency sources.

The designated stored-energy electrical emergency power source(s) of a microgrid system shall be permitted to remain interconnected to any available power production source during operation of the emergency source(s) where the lack of, or failure of, the interconnected power production source(s), or related controls, does not impact system operation. Interconnected power production sources, other than the designated stored emergency power source(s), shall not be required to meet the requirements of this article.

(H) Battery-Equipped Emergency Luminaires.

Δ (1) Listing. All battery-equipped emergency luminaires shall be listed.

Informational Note No. 1: See ANSI/UL 924, Emergency Lighting and Power Equipment, for the requirements covering battery-equipped emergency luminaires and emergency battery packs. A listed emergency battery pack installed in a listed luminaire will provide similar functionality as a listed battery-equipped emergency luminaire.

Informational Note No. 2: Unit equipment is a type of battery-equipped emergency luminaire.

Δ (2) Installation. Battery-equipped emergency luminaires shall be installed in accordance with the following:

(1) Battery-equipped emergency luminaires shall be permanently fixed in place (i.e., not portable).

(2) Wiring to each luminaire shall be installed in accordance with the requirements of any of the wiring methods in Chapter 3 unless otherwise specified in Part II, IV, or V of this article. Flexible cord-and-plug connection shall be permitted for unit equipment, provided that the cord does not exceed 900 mm (3 ft) in length. Flexible cord, with or without a plug, shall also be permitted for battery-equipped emergency luminaires installed in accordance with 410.62(C)(1).

(3) The branch circuit feeding the battery-equipped emergency luminaire shall be one of the following:
a. The same branch circuit as that serving the normal lighting in the area and connected ahead of any local switches.

b. The same or a different branch circuit as that serving the normal lighting in the area if that circuit is equipped with means to monitor the status of that area's normal lighting branch circuit ahead of any local switches.

c. A separate branch circuit originating from the same panelboard as one or more normal lighting circuits. This separate branch circuit disconnecting means shall be provided with a lock-on feature.

(4) The branch circuit that feeds battery-equipped emergency luminaires shall be clearly identified at the distribution panel.

(5) Emergency luminaires that obtain power from a battery-equipped emergency luminaire shall be wired to the battery-equipped emergency luminaires as required in Part II, IV, or V of this article.

(6) Remote luminaires providing lighting for the exterior of an exit door shall be permitted to be supplied by the battery-equipped emergency luminaire serving the area immediately inside the exit door.

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

Δ (B) System Reliability. Emergency lighting systems shall be designed and installed so that the failure of any illumination source, or branch circuit supplying an illumination source, cannot leave in total darkness any space that requires emergency illumination. Emergency lighting control devices in the emergency lighting system shall be listed for use in emergency systems. Listed unit equipment in accordance with 700.12(H) shall be considered as meeting the provisions of this section.

Informational Note: See 700.23 through 700.26 for applications of emergency system control devices.

(C) Discharge Lighting. Where high-intensity discharge lighting such as high- and low-pressure sodium, mercury vapor, and metal halide is used as the sole source of normal illumination, the emergency lighting system shall be required to operate until normal illumination has been restored.

(D) Disconnecting Means. Where an emergency system is installed, emergency illumination shall be provided in the area of the disconnecting means required by 225.31 and 230.70, as applicable, where the disconnecting means are installed indoors.

(a) Exit signs with open bottom lighting shall not be used in lieu of a required pathway light unless specifically approved for the purpose.

(b) 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.

Δ 700.17 Branch Circuits for Emergency Lighting.
Branch circuits that supply emergency lighting shall be installed to provide service from a source complying with 700.12 when the normal supply for lighting is interrupted. Such installations shall provide either of the following, so that the failure of any branch circuit supplying an illumination source cannot leave in total darkness any space that requires emergency illumination:

(1) An emergency lighting supply, independent of the normal lighting supply, with provisions for automatically transferring the emergency lights upon the event of failure of the normal lighting supply.

(2) Two or more branch circuits supplied from separate and complete systems with independent power sources. One of the two power sources and systems shall be part of the emergency system, and the other shall be permitted to be part of the normal power source and system. Each system shall provide sufficient power for emergency lighting purposes.

Unless both systems are used for regular lighting purposes and both are kept lighted, means shall be provided for automatically energizing either system upon failure of the other. Either system or both systems shall be permitted to be a part of the general lighting of the protected occupancy if circuits supplying lights for emergency illumination are installed in accordance with other sections of this article.

Δ 700.32 Selective Coordination.

N **(A) General**. Emergency overcurrent protective devices (OCPDs) shall be selectively coordinated with all supply-side and load-side OCPDs.

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.

N **(B) Replacements.** Where emergency system(s) OCPDs are replaced, they shall be reevaluated to ensure selective coordination is maintained with all supply-side and load-side OCPDs.

Δ (C) Modifications. If modifications, additions, or deletions to the emergency system(s) occur, selective coordination of the emergency system(s) OCPDs with all supply-side and load-side OCPDs shall be reevaluated.

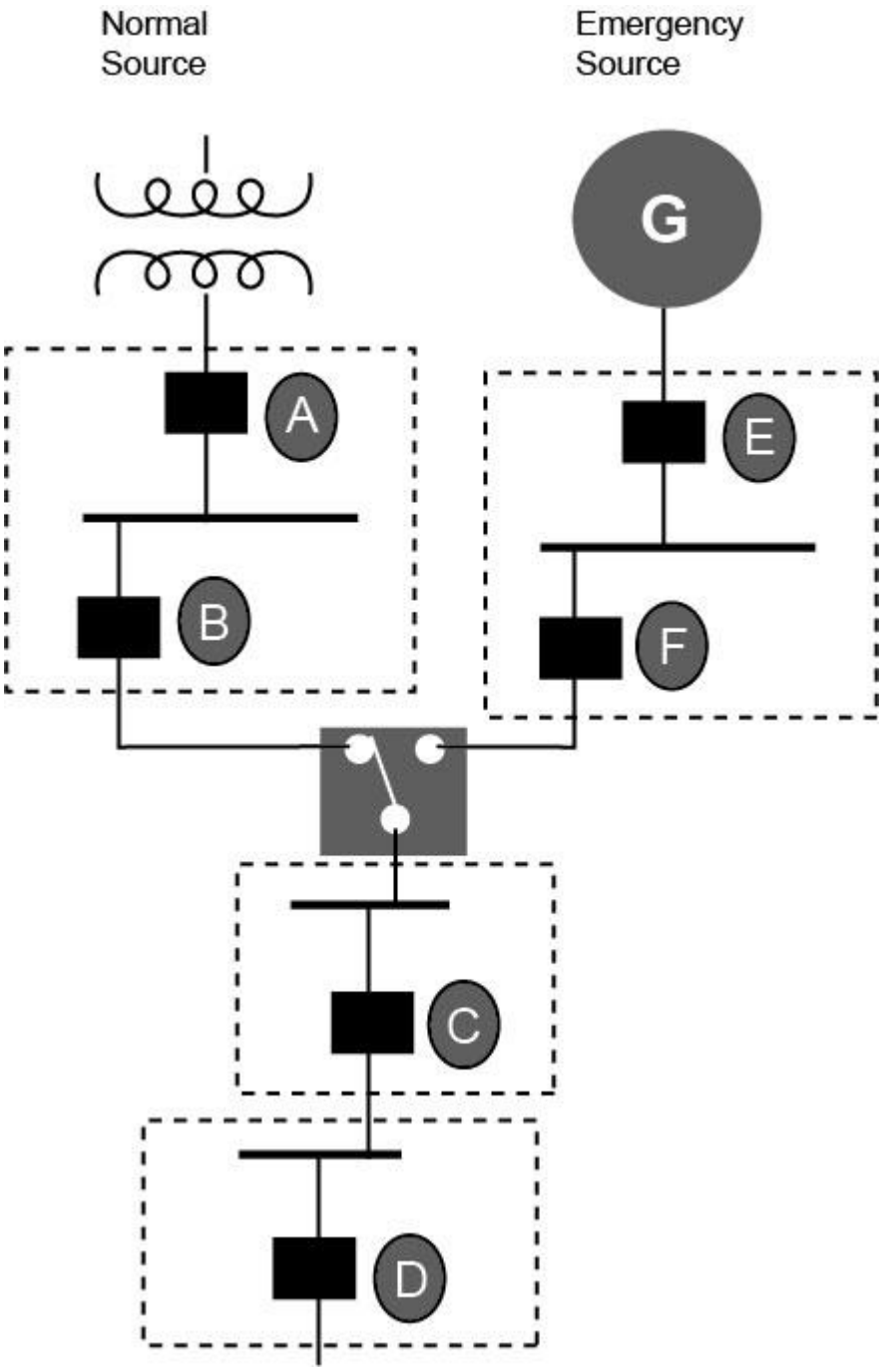
Exception No. 1: Selective coordination shall not be required between two overcurrent devices located in series if no loads are connected in parallel with the downstream device.

Exception No. 2: When an electrical engineer provides stamped and signed time current curves, the 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.

Exception No. 3 to (A), (B) and (C): Selective coordination shall not be required for emergency overcurrent protective devices installed prior to June 1, 2006.

Informational Note: The requirements of WAC 296-46B-700.032 are incorporated herein with edits.

Informational Note: See Informational Note Figure 700.32 for an example of how emergency system OCPDs selectively coordinate with all supply-side OCPDs.



Informational Note Figure 700.32 Emergency System Selective Coordination. OCPD D selectively coordinates with OCPDs C, F, E, B, and A. OCPD C selectively coordinates with OCPDs F, E, B, and A. OCPD F selectively coordinates with OCPD E. OCPD B is not required to selectively coordinate with OCPD A because OCPD B is not an emergency system OCPD.

ARTICLE 701
Legally Required Standby Systems

Δ 701.32 Selective Coordination.
***N* (A) General**. Legally required standby system(s) overcurrent protective devices (OCPDs shall be selectively coordinated with all supply-side and load-side OCPDs.

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.

***N* (B) Replacements.** Where legally required standby OCPDs are replaced, they shall be reevaluated to ensure selective coordination is maintained with all supply-side and load-side OCPDs.

Δ (C) Modifications. If modifications, additions, or deletions to the legally required standby system(s) occur, selective coordination of the legally required system(s) OCPDs with all supply-side and load-side OCPDs shall be reevaluated.

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 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.

Exception No. 3 to (A), (B) and (C):Selective coordination shall not be required for legally required standby overcurrent protective devices installed prior to June 1, 2006.

Informational Note: The requirements of WAC 296-46B-701.032 are incorporated herein with edits.

Informational Note: See Informational Note Figure 701.32 for an example of how legally required standby system OCPDs selectively coordinate with all supply-side OCPDs.

ARTICLE 702
Optional Standby Systems

702.7 Signs.

Δ **(A) Standby.** A sign shall be placed at the service equipment for other than one- and two-family dwellings that indicates the type and location of each on-site optional standby power source. For one- and two-family dwelling units, a sign shall be placed at the disconnecting means required in 230.85 that indicates the location of each permanently installed on-site optional standby power source disconnect or means to shut down the prime mover as required in 445.19(C).

The sign(s) required in this section must be placed where required and at the meter base if the meter base is not located within sight and within five feet of where the sign is required. When a disconnecting means required by NEC 230.85 is not present, the sign(s) required in this section must be placed at the service disconnecting means and the meter base if the service disconnecting means and the meter base are not located within sight and within five feet of each other.

Informational note: the requirements of WAC 296-46B-702 007 are incorporated herein with edits

Δ (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).

Δ (C) Power Inlet. Where a power inlet is used for a temporary connection to a portable generator, a warning sign shall be placed near the inlet to indicate the type of derived system that the system is capable of based on the wiring of the transfer equipment. The sign shall display one of the following warnings:

WARNING:
FOR CONNECTION OF A SEPARATELY DERIVED (BONDED NEUTRAL) SYSTEM ONLY

or
WARNING:
FOR CONNECTION OF A NONSEPARATELY DERIVED (FLOATING NEUTRAL) SYSTEM ONLY

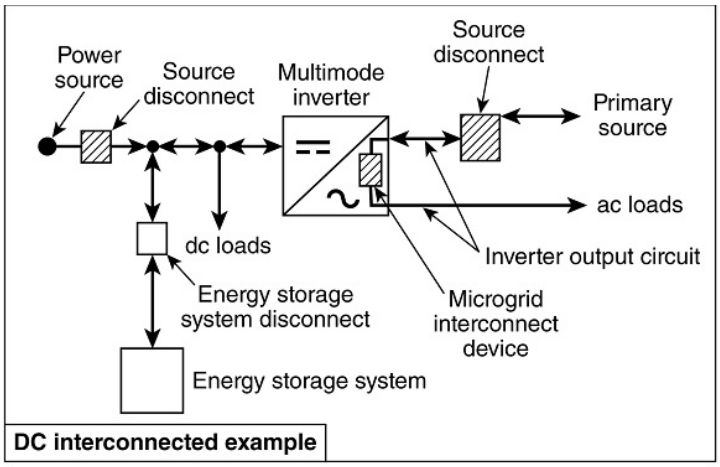
ARTICLE 705
Interconnected Electric Power Production Sources

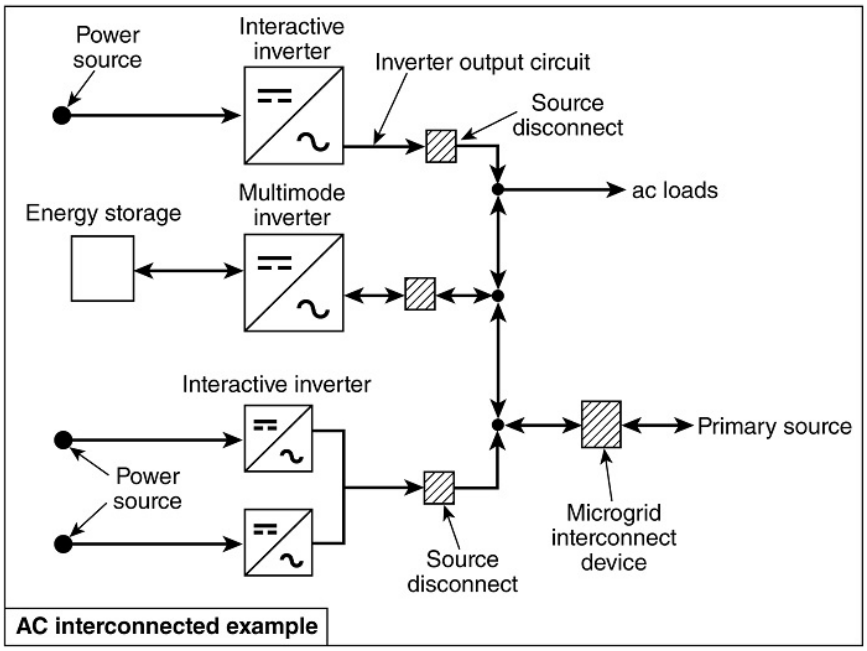
Δ 705.1 ((~~Scope~~)) General.

(A) Scope. This article covers installation of one or more electric power production sources operating in parallel with a primary source(s) of electricity.

Informational Note No. 1: Examples of the types of primary sources include a utility supply or an on-site electric power source(s).

Informational Note No. 2: See **Informational Note Figure 705.1**.





Notes:
(1) These diagrams are intended to be a means of identification for power source components, circuits, and connections.
(2) The power source disconnect in these diagrams separates the power source from other systems.
(3) Equipment disconnecting means not shown.
(4) System grounding and equipment grounding are not shown.
(5) Custom designs occur in each configuration, and some components are optional.

N **Informational Note Figure 705.1** Identification of Power Source Components in Common Configurations

(B) Utility Requirements. The serving utility shall be consulted by the owner, the owner's agent, or the contractor making the installation to ensure compliance with the requirements of the utility.

Informational Note No. 1: See Seattle City Light's *Requirements for Electrical Service Connection* for information on specific utility requirements.

Informational Note No. 2: The requirements of WAC 296-46B-705 (1) are incorporated herein with edits.

Δ 705.11 Source Connections to a Service.

N **(A) Service Connections.** An electric power production source shall be permitted to be connected to a service by one of the following methods:

(1) To a new service in accordance with 230.2(A)

(2) To the supply side of the service disconnecting means in accordance with 230.82(6)

(3) To an additional set of service entrance conductors in accordance with 230.40, Exception No. 5
These connections shall comply with 705.11(B) through (F).

Δ (B) Conductors. Service conductors connected to power production sources shall comply with the following:

(1) The ampacity of the service conductors connected to the power production source service disconnecting means shall not be less than the sum of the power production source maximum circuit current in 705.28(A).
(2) The service conductors connected to the power production source service disconnecting means shall be sized in accordance with 705.28 and not be smaller than 6 AWG copper or 4 AWG aluminum or copper-clad aluminum.
(3) The ampacity of any other service conductors to which the power production sources are connected shall not be less than that required in 705.11(B).

(C) Connections. Connections to service conductors or equipment shall comply with 705.11(C)(1) through (C)(3).

N **(1) Splices or Taps.** Service conductor splices and taps shall be made in accordance with 230.33 or 230.46 and comply with all applicable enclosure fill requirements.

N **(2) Existing Equipment.** Any modifications to existing equipment shall be made in accordance with the manufacturer's instructions, or the modification must be field evaluated for the application and be field labeled.

N **(3) Utility-Controlled Equipment.** For meter socket enclosures or other equipment under the exclusive control of the electric utility, only connections approved by the electric utility shall be permitted.

N **(D) Service Disconnecting Means.** A disconnecting means in accordance with Parts VI through VII of Article 230 shall be provided to disconnect all ungrounded conductors of a power production source from the conductors of other systems. The disconnecting means providing overcurrent protection for the electric power production source conductors must comply with NEC 230.82(6). This disconnect is not required to be grouped with the service disconnecting means for the building or structure. Grounding and bonding must be in accordance with NEC 250.25.

N **(E) Bonding and Grounding.** All metal enclosures, metal wiring methods, and metal parts associated with the service connected to a power production source shall be bonded in accordance with Parts II through V and VIII of Article 250.

Δ (F) Overcurrent Protection. The power production source service conductors shall be protected from overcurrent in accordance with Part VII of Article 230. The rating of the overcurrent protection device of the power production source service disconnecting means shall be used to determine if ground-fault protection of equipment is required in accordance with 230.95.

(G) Wiring methods. Electric power production source conductors connected to the supply side of the service disconnecting means must be installed using wiring methods specified for service conductors in Seattle Electrical Code 230.43.

Informational Note: The requirements of WAC-296-46B-705 011(2) are incorporated herein with edits

Δ 705.12 Load-Side Source Connections.
The output of an interconnected electric power source shall be permitted to be connected to the load side of the service disconnecting means of the other source(s) at any distribution equipment on the premises. Where distribution equipment or feeders are fed simultaneously by a primary source of electricity and one or more other power source(s), the feeders or distribution equipment shall comply with relevant sections of 705.12(A) and (B). Currents from power source connections to feeders or busbars shall be based on the maximum circuit currents calculated in 705.28(A). The ampacity of feeders and taps shall comply with 705.12(A), and the ampere ratings of busbars shall comply with 705.12(B).

(A) Feeders and Feeder Taps. Where the power source output connection is made to a feeder, the following shall apply:

(1) The feeder ampacity is greater than or equal to 125 percent of the power-source output circuit current.

(2) Where the power-source output connection is made 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 rating of the primary source overcurrent device and 125 percent of the power-source output circuit current.
b. An overcurrent device at the load side of the power source connection point shall be rated not greater than the ampacity of the feeder.

(3) For taps sized in accordance with 240.21(B)(2) or (B)(4), the ampacity of taps conductors shall not be less than one-third of the sum of the rating of the overcurrent device protecting the feeder plus the ratings of any power source overcurrent devices connected to the feeder.

(B) Busbars. For power source connections to distribution equipment with no specific listing and instructions for combining multiple sources, one of the following methods shall be used to determine the required ampere ratings of busbars:

(1) The sum of 125 percent of the power source(s) output circuit current and the rating of the overcurrent device protecting the busbar shall not exceed the busbar ampere rating.

Informational Note: This general rule assumes no limitation in the number of the loads or sources applied to busbars or their locations.

(2) Where two sources, one a primary power source and the other another power source, are located at opposite ends of a busbar that contains loads, the sum of 125 percent of the power-source(s) output circuit current and the rating of the overcurrent device protecting the busbar shall not exceed 120 percent of the busbar ampere rating. 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 OUTPUTDO NOT RELOCATE THIS OVERCURRENT DEVICE.

The warning sign(s) or label(s) shall comply with 110.21(B).

(3) The sum of the ampere ratings of all overcurrent devices on panelboards, both load and supply devices, excluding the rating of the overcurrent device protecting the busbar, shall not exceed the ampacity of the busbar. The rating of the overcurrent device protecting the busbar shall not exceed the rating of the busbar. Permanent warning labels shall be applied to distribution equipment displaying the following or equivalent wording:

WARNING:
EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE SHALL NOT EXCEED AMPACITY OF BUSBAR.

The warning sign(s) or label(s) shall comply with 110.21(B).

(4) A connection at either end of a center-fed panelboard in dwellings shall be permitted where the sum of 125 percent of the power-source(s) output circuit current and the rating of the overcurrent device protecting the busbar does not exceed 120 percent of the busbar ampere rating.

(5) Connections shall be permitted on busbars of panelboards that supply lugs connected to feed-through conductors or are supplied by feed-through conductors. The feed-through conductors. The feed-through conductors shall be sized in accordance with 705.12(A). Where an overcurrent device is installed at either end of the feed-through conductors, panelboard busbars on either side of the feed-through conductors shall be permitted to be sized in accordance with 705.12(B)(1) through (B)(3).

(6) Connections shall be permitted on switchgear, switchboards, and panelboards in configurations other than those permitted in 705.12(B)(1) through (B)(5) where designed under engineering supervision that includes available fault-current and busbar load calculations.

Informational Note: Specifically designed equipment exists, listed to UL 1741, *Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources*, for the combination and distribution of sources to supply loads. The options provided in 705.12(B) are for equipment with no specific listing for combining sources.