ELEC CODE
Ordinance No. 122970

Council Bill No. 116498

An ordinance relating to building and construction codes: amending Section 22.300.016 of the Seattle Municipal Code, to adopt the 2008 National Electrical Code with Seattle amendments and to adopt by reference specific portions of the Washington Administrative Code Chapter 296-46B (Washington State Electrical Rule).

Related Legislation File: C7 309937

Date Introduced and Referred: 4-13-09	To: (committee): Planning, Land Use & Neighborhoods (PLUNC)
Date Re-referred:	To: (committee):
Date Re-referred:	To: (committee):
Date of Final Action: 4.27.09	Date Presented to Mayor: 4.28.09
Date Signed by Mayor: 5.6.09	Date Returned to City Clerk: 5.6.09
Published by Title Only ~~[illegible]~~ Published in Full Text ✓ 190	Date Vetoed by Mayor:
Date Veto Published:	Date Passed Over Veto:
Date Veto Sustained:	Date Returned Without Signature:

The City of Seattle – Legislative Department

Council Bill/Ordinance sponsored by: [signature]

Committee Action:

Date	Recommendation	Vote
APR 22, 2009	2.0 SC, TB	
	PASS	

This file is complete and ready for presentation to Full Council.

Law Department

Full Council Action:

Date	Decision	Vote
4/27/09	Pass	8.0 (SC excused)

City of Seattle

Gregory J. Nickels, Mayor

Office of the Mayor

March 31, 2009

Honorable Richard Conlin, President
Seattle City Council
City Hall, 2nd Floor

Dear Council President Conlin:

I am pleased to transmit the attached proposed Council Bill adopting the 2008 Seattle Electrical Code. The bill is a triennial update of the Code adopting the National Electrical Code (NEC) with Seattle amendments. This legislation, including the local amendments, promotes a safe and sustainable Seattle.

While the majority of the proposed amendments did not generate any comment during the public review process, a change in the code requiring that residential units have adequate electrical capacity to provide for the future charging of plug-in electric vehicles, provisions related to greater fire safety, and clarifications regarding standards for coordinated tripping of overcurrent protective devices, did garner some discussion. The proposed code revisions, which are detailed in the attachment to the fiscal note accompanying this legislation, have been approved by the Construction Advisory Committee.

Thank you for your consideration of this legislation. Should you have questions, please contact Vicki Baucom at 233-2757.

Sincerely,

GREG NICKELS
Mayor of Seattle

cc: Honorable Members of the Seattle City Council

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Vicki Baucom/vb
DPD – 2008 Electrical Code ORD
April 10, 2009
Version #4

ORDINANCE 122970

AN ORDINANCE relating to building and construction codes amending Section 22.300.016 of the Seattle Municipal Code, to adopt the 2008 National Electrical Code with Seattle amendments and to adopt by reference specific portions of the Washington Administrative Code Chapter 296-46B (Washington State Electrical Rule).

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. Section 22.300.016 of the Seattle Municipal Code is amended as follows:

22.300.016 Adoption of the Electrical Code((~~.~~))

The National Electrical Code, ((~~2005~~))2008 edition, published by the National Fire Protection Association, and Washington Administrative Code (WAC) Chapter 296-46B, one copy of each which is filed with the City Clerk in C.F. ((~~307578~~)) _____ , are hereby adopted and by this reference made a part of this subtitle. The National Electrical Code, ((~~2005~~))2008 edition, and selected portions of WAC 296-46B, together with the amendments and additions thereto adopted by this ordinance, constitute the Seattle Electrical Code.

Section 2. The entirety of the 2005 National Electrical Code with Seattle amendments except Article 80, adopted by Ordinance 121919, is hereby repealed.

Section 3. Article 80 of the 2005 Seattle Electrical Code, adopted by Ordinance 121919, is amended and adopted to read as follows:

ARTICLE 80

((~~Application and Enforcement of this Code~~)) Administration

I. Title, Purpose and Scope ((~~Application and Enforcement of this Code~~))

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80.1 Title. This ((e))*Code* shall be known as the ((~~"Seattle Electrical Code Supplement" or~~)) "Seattle Electrical Code" and may be so cited. It is referred to herein as the "Electrical Code" or "this ((e))*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 promote public safety in a practical manner from hazards arising from the use of electricity. This ((e))*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 ((e))*Code*. This ((e))*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 ((e))*Code* is to provide equal, higher or better standards of construction and equal, higher or better standards of materials, devices, appliances and equipment than that required by the State of Washington under the provisions of Chapter 19.28 RCW (Revised Code of Washington). Only ((T))those sections of the Washington State Electrical Code amending the *National Electric*

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Code, as set forth at Chapter 296-46B of the Washington Administrative Code (WAC), specifically referenced in this *Code* by a fine print note, hereafter designated as FPN are adopted. The City incorporates by reference these adopted WAC provisions in each individual FPN.

80.3 Scope. The Electrical Code shall apply to all electrical wiring and equipment, including communications systems, installed or used within the City.

Exception No. 1: Installations in ships and watercraft not connected to public utilities, railway rolling stock, aircraft or automotive vehicles.

Exception No. 2: Installations of railways or generation, transformation, transmission or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communication purposes.

Exception No. 3: Installations of communication equipment under exclusive control of communication utilities, located outdoors or in building spaces used exclusively for such installations.

((~~*Exception No. 4: Installation of communication or signaling equipment used exclusively for the operation of a municipal fire alarm or police telegraph system.*~~))

Exception No. 4 ((~~5~~)): 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 ((~~service~~)) conductors up to the service point, as defined by this

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Code, ((~~*point of connection to the customer's service entrance conductors*~~)) *shall be the responsibility of the serving utility.*

80.4 Application to Existing Buildings.

(A) Additions, Alterations and Repairs. Additions, alterations and repairs may be made to the electrical system of existing buildings or structures without making the entire electrical system comply with all of the requirements of this code for new buildings or structures, provided the additions, alterations or repairs ((~~that are~~)) made ((~~shall~~)) comply with the requirements of this ((~~e~~))*Code*. This section does not limit the effect of applicable retroactive ordinances.

Exception: Subject to the approval of the authority having jurisdiction, repairs may be made with the same materials of which the building or structure is constructed, other than for the replacement of receptacles as provided in NEC Section 406.3(D), provided the repair complies with the electrical code in effect at the time of original installation and provided further that no change shall be permitted which increases its hazard.

(B) Existing Electrical Systems. Electrical systems in existence at the time of the passage of this ((~~e~~))*Code* may continue to be used provided such use was legal at the time of the passage of this ((~~e~~))*Code* and provided continued use is not detrimental to public safety.

(C) Maintenance. All buildings or structures, both existing and new, and all parts thereof shall be maintained in a safe condition. All devices or safeguards required by this ((~~e~~))*Code* or by a code in effect when the building or structure was erected, altered or repaired shall be maintained in good working order. The owner or the owner's agent shall be responsible for the maintenance of buildings and structures.

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It shall be the duty of the owner or the owner's agent to maintain in a safe and usable condition all parts of buildings or equipment that are intended to assist in the extinguishing of fire, or to prevent the origin or spread of fire, or to safeguard life or property. It shall be unlawful to fail to comply with any notice or order of the fire chief or the authority having jurisdiction. *Exception: The authority having jurisdiction may modify the requirements of this subsection where all or a portion of a building is unoccupied.*

(D) Historic Buildings and Structures. The authority having jurisdiction may modify the specific requirements of this code as it applies to buildings and structures designated as landmarks ((~~of historical or cultural importance~~)) 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 or has been designated for preservation by the City Landmarks Preservation Board,

(3) that has been designated for preservation by the State of Washington,

(4) has been listed or determined eligible to be listed in the National Register of Historic Places, or

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(5) that is located in a landmark or special review district subject to a requirement to obtain a certificate of approval before making a change to the external appearance of the structure. ((~~A historic building or structure is one that has been designated for preservation by City Landmarks Preservation Board or the State of Washington; has been listed, or has been determined eligible to be listed, in the National Register of Historic Places; has been officially nominated for such status, or is a structure contributing to the character of a designated landmark or special review district.~~))

(E) Moved Buildings. Electrical permits for electrical work performed on a building or structure move into or within the City shall be obtained from the authority having jurisdiction. The authority having jurisdiction will inspect the electrical system for deficiencies and issue corrections. Deficiencies shall be corrected before a certificate of occupancy will be issued.

The service to a moved building or structure shall comply with this *Code*. Other than the service, a building or structure moved into or within the City is not required to comply with this *Code* if the original occupancy classification of the building or structure is not changed. A building or structure that undergoes a substantial alteration as defined in Chapter 34 of the *Seattle 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.

FPN: For the definition of *Occupancy Classification*, see Chapter 3 of the *Seattle Building Code*.

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((~~(E) Moved Buildings. Buildings or structures moved into or within the city shall comply with standards adopted by the authority having jurisdiction. No building shall be moved into or within the City unless, prior to moving, the authority having jurisdiction has inspected the building for compliance with those standards and the permit holder has agreed to correct all deficiencies found and has been issued an electrical permit for the work. Any moved building that is not in compliance with those standards within one year from the date of permit issuance and is found to be a public nuisance may be abated.~~

~~Buildings wired by standards other than those recognized by this code and the National Electrical Code are not in compliance with these provisions.~~))

80.5 Tests. Whenever there is insufficient evidence of compliance with the provisions of this ((~~e~~))*Code* or evidence that any ((~~material~~)) equipment or construction does not conform to the requirements of this ((~~e~~))*Code*, the authority having jurisdiction may require tests to be made, at no expense to the City, as proof of compliance.

Test methods shall be specified by this ((~~e~~))*Code* or by other recognized test standards. If there are no recognized and accepted test methods for the proposed alternate, the authority having jurisdiction shall determine the test procedures.

All tests shall be made by an ((~~approved~~))agency that has been approved by the authority having jurisdiction. The agency shall provide a report of the test results to the authority having jurisdiction which will retain the report((~~s of tests~~)).

80.6 Utilization Equipment and Alternate Materials and Methods of Wiring. This ((~~e~~))*Code* does not prevent the use of any utilization equipment, material, method or design of wiring not

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specifically allowed or prohibited by this ((~~e~~))*Code*, provided the same has been approved and its use authorized by the authority having jurisdiction.

The authority having jurisdiction may approve an alternate, provided((~~he/she finds that~~)) the proposed alternate complies with the provisions of this ((~~e~~))*Code* and the alternate, 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 alternate materials and methods, and any relevant information in the files of the authority having jurisdiction or on the approved permit plans.

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 ((~~e~~))*Code*. Prior to granting any modifications, ((~~T~~))the authority having jurisdiction must first find that:

(1) the strict application of this code is impractical under the circumstances; ((~~and~~))

(2) ((~~that~~)) the modification is in conformity with the intent and purpose of this ((~~e~~))*Code*;((~~and~~))

(3) the modification does not lessen any fire protection requirements;

(4) the modification does not lessen ((~~or~~))any degree of structural integrity.

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The authority having jurisdiction may, but is not required to, record the approval of modifications and any relevant information in the files of the authority having jurisdiction or on the approved permit plans.

II. Organization and Enforcement

80.10 Authority. Whenever the term or title "Authority Having Jurisdiction," "Administrative Authority," "Responsible Official," ((~~"Authority having jurisdiction,"~~)) "Chief Inspector" or "Code Enforcement Officer" is used in this ((~~e~~))*Code*, it ((~~shall be~~)) is construed to mean the Director of the Department of Planning and Development, who is the code official.((~~, and his or her designees.~~))

80.11 Powers and Duties of the Authority Having Jurisdiction.

(A) General. The authority having jurisdiction is authorized and directed to interpret and enforce the provisions and intent of this ((~~e~~))*Code*.

Compliance with the requirements of this ((~~e~~))*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.

(B) ((~~Deputies~~)) Designees. The authority having jurisdiction may appoint such officers, inspectors, assistants and other employees as shall be authorized from time to time. The authority having jurisdiction may ((~~deputize~~)) designate such employees as may be necessary to carry out the functions of the Department of Planning and Development.

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(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 duties imposed by this ((~~e~~))*Code*.

(D) Stop Work Orders. Whenever any installation, alteration, repair or removal of electrical work is being done contrary to the provisions of this ((~~e~~))*Code*, or in the event of dangerous or unsafe conditions related to electrical work, the authority having jurisdiction may issue a stop work order((~~order the affected work stopped and a notice~~)) describing the violation. ((~~in writing posted on the premises or served on any person responsible for the condition or work. It shall be unlawful for any person to engage in or cause any further work to be done until authorization from the authority having jurisdiction is received.~~))

(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, then the stop work order may be served in the manner set forth in Revised Code of Washington (RCW) 4.28.080 for service of a summons or by sending it 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.

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(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(D)(1) is served.

(3) Review by the Authority Having Jurisdiction for Stop Work Orders.

(a) Any person aggrieved by a stop work order may obtain a review of the order by delivering to the authority having jurisdiction a request in writing within 2 business days of the date of service of the stop work order.

The review shall occur within 2 business days after receipt by the authority having jurisdiction of the request for review unless the requestor agrees to a longer time.

Any person aggrieved by or interested in the stop work order may submit additional information to the authority having jurisdiction for consideration as part of the review at any time prior to the review.

(b) The review will be made by a representative of the authority having jurisdiction who will review all additional information received and may also request a site visit. After the review, the authority having jurisdiction may:

(1) Sustain the stop work order;

(2) Withdraw the stop work order;

(3) Modify the stop work order; or

(4) Continue the review to a date certain for receipt of additional information.

(c) The authority having jurisdiction shall issue an order of the authority having jurisdiction containing the decision within 2 business days after the review and shall cause the order to be

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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. The City and appellant shall be bound by the order.

(E) Authority to Disconnect Utilities in an Emergency. The authority having jurisdiction ((~~shall have~~))has the authority to disconnect or order discontinuance of any utility service or energy supply to buildings, structures or equipment ((~~therein~~)) regulated by this ((~~c~~))*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 notify the serving utility, the 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 ((~~that has been~~)) disconnected by the authority having jurisdiction until the equipment is((~~has been~~)) placed in a safe condition and is approved by the authority having jurisdiction.

(F) Liability. Nothing contained in this ((~~c~~))*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 ((~~in~~))consequence of any inspection, notice, order,

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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 Planning and Development 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 ((e))*Code* shall be personally liable for any damage that accrues to persons or property as a result of any act or omission committed in the discharge of their duties, provided that the authority having jurisdiction or employee acted in good faith and without malice.

(G) Code Interpretation or Explanation. Electrical inspectors may give information as to the meaning or application of the *National Electrical Code* and the ((~~Seattle Supplement~~))*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 so 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.

80.12 Unsafe Conditions or Code Violations.

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(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 ((ϵ))*Code*, the authority having jurisdiction is authorized to serve upon the owner or user a notice or order requiring 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 ((ϵ))*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 directing that the building or structure, or portion thereof, be restored to a safe condition. The order shall specify the time for compliance. The order may also require that the building or structure, or portion thereof, be vacated within a reasonable time, to be specified in the order. In the case of extreme danger, the order may specify immediate vacation of the building or structure, or may authorize disconnection of the utilities or energy source pursuant to Section 80.11(E). 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 and subject to the penalties provided in this *Code*.

80.13 Violations and Penalties.

(A) Violations. It shall be a violation of this ((ϵ))*Code* for any person, firm or corporation to:

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(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 ((e))*Code*;((. ~~It shall be a violation of this code for any person, firm or corporation to~~))

(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 ((e))*Code*;((. ~~It shall be a violation of this code for any person, firm or corporation to~~))

(3) use any materials or to install any device, appliance or equipment which does not comply with applicable standards of this ((e))*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*; or

(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.

(B) Notice of Violation. If, after investigation, the authority having jurisdiction determines that standards or requirements of this ((e))*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.

(1) Serving the Notice of Violation. The notice of violation shall state the standards or requirements violated, shall state what corrective action, if any, is necessary to comply with the

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standards or requirements, and shall set a reasonable time for compliance. The notice shall be served upon the owner, agent or other responsible person by personal service((~~, certified mail with return receipt requested or registered mail with return receipt requested~~)) or ((~~registered~~)) first class mail addressed to the last known address of such person. If no address is available after reasonable inquiry, ((~~In addition, a copy of~~)) 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((~~n~~)) 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 ((~~sub~~))section((~~shall be deemed to~~)) limits or precludes any action or proceeding to enforce this ((~~code~~))Article, and nothing ((~~in this section shall be deemed to~~)) obligates or requires the authority having jurisdiction to issue a notice of violation prior to the imposition of civil or criminal penalties((~~ in this section~~)).

(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 aggrieved by or interested in the notice of violation may submit additional information to the authority having jurisdiction within ten days after the request for review if

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filed, unless the authority having jurisdiction and the person request 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. Continue the review to a date certain; or

4. Amend the notice.

(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.

(C) Judicial review. Because civil actions to enforce Title 22 Seattle Municipal Code are brought in Seattle Municipal Court pursuant to Section 80.13(D), orders of the authority having jurisdiction issued under this chapter are not subject to judicial review pursuant to Chapter 36.70C *Revised Code of Washington* (RCW).

((~~C~~))**(D) Civil Penalties**((~~y~~)). ~~Any person, firm or corporation failing to comply with the provisions of this code shall be subject to a cumulative civil penalty in an amount not to exceed~~

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~~$500 per day for each violation from the date the violation occurs or begins until compliance is achieved.~~

(1) Any person violating or failing to comply with the provisions of this *Code* shall be subject to a cumulative civil penalty in an amount not to exceed $500 per day for each violation from the date the violation occurs or begins until compliance is achieved. In cases where the 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) 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.

((~~D~~))(E) Criminal Penalties. ((~~(1)~~)) Anyone violating or failing to comply with any notice of violation or order issued by the authority having jurisdiction pursuant to this ((~~e~~))*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((~~1,000~~)) or by imprisonment for not more than 365((~~0~~)) days, or by both such fine and imprisonment for each separate violation. Each day's violation ((~~or failure to comply~~) shall constitute a separate offense.

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((~~(2) Anyone violating or failing to comply with any of the provisions of this code and who within the past five years has had a judgment against them pursuant to Section 80.13(B), shall upon conviction thereof be fined in a sum not to exceed $500 or by imprisonment for not more than 180 days, or by both such fine and imprisonment. Each day's violation or failure to comply shall constitute a separate offense.~~))

((~~(E)~~))**(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((~~that constitutes a violation of this code when civil or criminal penalties are inadequate to effect~~)) compliance.

80.14 Recording of Notices. ((~~It shall be unlawful for any person to remove, mutilate, destroy or conceal any lawful notice issued or posted by the authority having jurisdiction pursuant to the provisions of this code.~~))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((~~notification~~)) 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,

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rules and regulations shall be in conformity with the intent and purpose of this *Code*. ((~~The authority having jurisdiction is authorized to promulgate, adopt and issue the following rules:~~

~~(1) "Electrical Wiring Standards" to promulgate standards that are acceptable as a method or as an alternative design for meeting code required performance criteria, to edit or update national standards that are referenced in the *Electrical Code* and to eliminate conflicts among code requirements.~~

~~(2) "Code Interpretations" to interpret and clarify conditions or language expressed in this code.~~

~~(3) "Product Approvals" to approve a specific building construction material or product, or a particular component fabricator that has been found acceptable as meeting required performance criteria of this code.~~

~~(4) Any other rule necessary for administration of the purpose and intent 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 ((~~e~~))*Code* and any proposed administrative rules promulgated to enforce this ((~~e~~))*Code*. The Electrical Code Committee may make recommendations to the authority having jurisdiction and to the City Council relating to

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this ((~~e~~))*Code* and administrative rules. The committee may((~~shall~~)) be called on an as-needed basis for the Construction Codes Advisory Board.

80.17 Appeals. Except for stop work orders, notices of violation and revocation of permits, appeals from decisions or actions pertaining to the administration and enforcement of this ((~~e~~))*Code* shall be addressed in writing to the authority having jurisdiction. The appellant((~~applicant~~)) may request a review by a panel of the Construction Codes Advisory Board, convened by the Board Chair. The chair shall select a panel of at least three members from the Electrical Code Committee. The results of the review panel's review shall be advisory only. The final decision on any appealable matter is made by the authority having jurisdiction.

~~((**80.18 Review by the Director.**~~

~~(A) Any party affected by a notice of violation issued by the Director pursuant to Section 80.13(B) may obtain a review of the notice by requesting such review in writing within ten days after service of the notice. When the last day of the period computed is a Saturday, Sunday, federal or City holiday, the period shall run until 5:00 p.m. of the next business day. Upon receipt of a request, the Director shall notify the person requesting the review of the date, time and place of the Director's review. The review shall be not less than ten nor more than twenty days after the request is received, unless otherwise agreed by the person requesting the review. Any person affected by the notice of violation may submit any written material to the Director for consideration on or before the date of the review.~~

~~(B) The review will consist of an informal review meeting held at the Department. A representative of the Director who is familiar with the case and the applicable ordinances will~~

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~~attend. The Director's representative shall explain the reasons for the issuance of the notice of violation and will consider any information presented by the persons attending. At or after the review, the Director shall:~~

~~(1) Sustain the notice of violation; or~~

~~(2) Withdraw the notice of violation; or~~

~~(3) Continue the review to a future date certain; or~~

~~(4) Amend the notice of violation.~~

~~(C) The Director shall issue a decision within a reasonable time after the conclusion of the review. The Director shall mail the decision by regular first class mail to the person or persons named in the notice of violation.~~))

III. Permits and Inspections

80.50 Permits.

(A) Permit((s)) Required. It shall be unlawful to install, alter, extend or connect any electrical equipment in a building or premises, or allow the same to be done, without first obtaining a permit for the work from the authority having jurisdiction.

(B) Exempted Work. An electrical permit shall not be required for the following work:

(1) Replacing flush or snap switches, fuses, lamp sockets, receptacles, or ballasts.

(2) Reconnecting or replacing a range within an individual dwelling unit, hot plate, water heater, electric baseboard, and wall-heating unit to a circuit that has been lawfully installed and approved, when no alteration of the circuit is necessary.

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(3) The setting of meters by ((~~the~~))Seattle City Light ((~~Department of the City of Seattle~~)) or anyone else engaged in the business of supplying electricity to the public, provided that meter loops have been installed under permit and that such meters are not connected to any electrical installation regulated by this ((~~c~~))*Code* until approval for such connection has been given by the authority having jurisdiction.

(4) Wiring for communication systems, as set forth in *NEC* Chapter 8 and Article 770, as follows:

(a) in ((~~single~~))one- and two- family ((~~residences~~))dwellings, or

(b) installations of 1000 feet or less.

(5) The installation or repair of electrical equipment installed in connection with an elevator, dumbwaiter, or similar conveyance provided ((~~that~~))such work is covered under the issuance of an elevator permit.

Exemption from the permit requirements of this ((~~c~~))*Code* shall not be deemed to grant authorization for ((~~any~~))work ((~~to be~~))done in any manner ((~~in~~))that violates((~~ion of~~)) the provisions of this ((~~c~~))*Code* or any other laws or ordinances of the City.

(C) 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. ((~~295948~~))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.

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80.51 Application and Plans.

(A) Application. Application for an electrical permit shall be made on a form provided by the authority having jurisdiction. Each application shall:

(1) state the name and address of the owner or occupant in possession of the building or premises where the work is to be done;

(2) state the name, address and phone number of the person responsible for the installation together with state license number of the licensed contractor, if any ((~~that will be responsible for the installation, and such other information as the authority having jurisdiction may require.~~));

(3) provide details about the electrical installation, including drawings as required by the authority having jurisdiction and this *Code*; and

(4) ((~~Application shall~~)) 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) Plans and Specifications.

(1) General. In addition to the requirements of Section 80.51(A), two sets of plans and specifications shall be submitted with each application for an electrical permit for ((~~an~~)) installation of the following:

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

(b) all switches, circuit breakers and equipment rated 400 amperes or over;

(c) any equipment operating at voltages exceeding 600;

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(d) services, feeders and power supplies for emergency, legally required standby or fire pump systems;

(e) any proposed alteration or installation the scope of which covers more than 2,500 square feet;

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

(g) new or altered electrical installations in educational, institutional, and health or personal care occupancies as required in WAC ((~~296-46B-010 (15) and (16)~~))296-46B-900(1); (3)(a), (b), (c), (e) & (g); and WAC ((~~296-46B-010~~))269-46B-900 Tables ((~~010-1 and 010-2~~)) 900-1 and 900-2.

Exception to (a) through (g): ((~~Plan and specifications shall not be required~~)) 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) solar systems or other renewable energy systems

Exception to (h): Renewable energy systems rated 26 kW or less shall submit one set of line drawings showing all system components.

((~~Three sets of plans and specifications for fire alarm systems shall be submitted. See Seattle Fire Code Section 907 for required submittal information.~~))

(2) Fire Department Review. Three sets of plans and specifications for fire alarm systems shall be submitted. See Seattle Fire Code Section 907 for required submittal information.

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(3)((~~2~~)) Clarity of Plans. Plans shall be drawn to a clearly indicated and commonly accepted scale upon substantial paper ((~~of not less than 1/8 inch to 1 foot~~)) such as blueprint quality or standard drafting paper. The plans shall be of microfilm quality and limited to a minimum size of 11 inches by 17 inches (279 mm by 432 mm) and maximum size of 41 inches by 54 inches (1041 mm by 1372 mm). 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 ((~~e~~))*Code.* All electrical work shall be readily distinguishable from other mechanical work. If plans are incomplete, unintelligible or indefinite, 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.

FPN: At such time as the authority having jurisdiction accepts electronically submitted plans, such plans shall be in a format acceptable to the authority having jurisdiction.

(4)((~~3~~)) Information on Plans and Specifications. 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 one line diagram to include all service and feeder connections.

(c) Clear identification of all circuitry, to include but not limited to: circuit numbers, wire sizes, insulation types, conduit sizes and types.

(d) A complete set of switchboard and panel schedules. These shall include all load calculations and demand factors used for computation.

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(e) A complete project load summary to include existing loads as computed in accordance with *NEC* Article 220 and all added loads. Electrical calculations, heat loss calculations and lighting summaries may be submitted on separate computation sheets.

(f) Fault current calculations and the listed interrupting rating of all feeder and service equipment.

(g) Voltage characteristics of all electrical systems and equipment.

(h) A key to all symbols used.

(i) A schedule showing all pertinent luminaire information.

(j) Any other information as may be required by the plans examiner.

(k) Selective coordination as required per 620.62, 700.27, 701.18 and 708.54 of this *Code*.

(C) Advance Plan Examination. An architect or engineer registered in the State of Washington may apply for an electrical permit and may request an advance plan examination of electrical plans where the electrical contractor has not yet been selected. Upon submission of an application including required plans, and payment of fifty percent of the estimated permit fee, the ((~~Department~~))authority having jurisdiction will review the application. ((~~When~~))If the application and plans are found to be in compliance with the Seattle Electrical Code, the ((~~Department~~))authority having jurisdiction will approve the application and plans as ready for issuance. Neither the permit nor the plans ((~~shall~~)) can be issued until the remainder of the fee required by the Fee Subtitle is paid and the electrical contractor's name and license number is placed on the permit.

80.52 Permits.

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(A) Issuance.

(1) General. The application and plans filed by an applicant for a permit shall be checked by the authority having jurisdiction. Such plans may be reviewed by other departments of the City to check compliance with the laws and ordinances under their jurisdiction. If the authority having jurisdiction finds that the work as described in an application for permit and the plans filed therewith conforms to the requirements of this code and other pertinent laws and ordinances and that the fees specified in the Fee Subtitle have been paid, the authority having jurisdiction shall issue a permit to the applicant who becomes the permit holder. The authority having jurisdiction may refuse to issue an electrical permit to any person who refuses or fails to complete the work permitted by an existing permit(s) on the same building or premises.

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 ((e))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 ((e))Code and in accordance with the plans as subsequently approved.

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(2) Compliance with Approved Plans and Permit. 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) Amendments to the Permit. When modifications, substitutions and changes to the approved work are made during construction, approval of the authority having jurisdiction shall be ((~~secured~~))obtained prior to execution.((~~; however, t~~))The electrical inspector may approve minor modifications, substitutions and changes to the plans for work not reducing the fire and life safety of the structure. Substitutions, changes and clarifications shall be as shown on two sets of plans that shall be submitted to the authority having jurisdiction, accompanied by ((~~redesign~~)) fees specified in the Fee Subtitle prior to occupancy. All substitutions and ((~~These~~))changes shall conform to the requirements of this ((~~e~~))*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.

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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) 12 months following the date of application; or

(2) 60 days from the date of written notice that the permit is ready to issue.

After cancellation, plans and other data submitted for review may be returned to the applicant or destroyed by the authority having jurisdiction.

The authority having jurisdiction will notify the applicant in writing at least 30 days before the application is cancelled. The notice shall specify a date by which a request for extension must be submitted in order to avoid cancellation. The date shall be at least two weeks prior to the date on which the application will be cancelled.

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 cancellation, the applicant shall submit a new application and pay a new fee to restart the permit process.

Exception: Not withstanding other provisions of this Code, applications may be extended where issuance of the permit is delayed by litigation, preparation of environmental impact statements,

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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.

((~~If a permit is not issued after a period of sixty days from the date of approval for issuance or if corrections are not received after a period of sixty days from the date of notification of required corrections, the authority having jurisdiction may initiate cancellation procedures. Prior to cancellation, the authority having jurisdiction shall notify the applicant that the permit application will expire and shall be canceled after 30 days. After the applicant has been notified, the site may be inspected to verify that no work has taken place. The application shall be canceled 30 days after notice has been sent to the applicant, and it and any accompanying plans and specifications may be destroyed and the portion of the fee paid forfeited. Upon written request of the applicant, the authority having jurisdiction may extend the life of the permit application for a period not to exceed six months, with no further extensions possible, except that applications may be further extended by the authority having jurisdiction where permit issuance is delayed by litigation, appeals or similar problems.~~))

(B) Retention of Plans and Permits. One set of approved plans, which may be on microfilm, shall be retained by the authority having jurisdiction. One set of approved plans shall be returned to the applicant and shall be kept at the site or the building or work for use by inspection personnel at all times during which the work authorized ((~~thereby~~))is in progress. ((~~The plans shall be available at the site of the work or installation for use by inspection personnel at all times.~~)) The permit issued by the authority having jurisdiction shall be kept posted on the premises at all times during the course of the installation or work.

(C) Validity. The issuance or granting of a permit or approval of plans shall:

(1) not be construed to be a permit for, or an approval of, any violation of any of the provisions of this ((~~e~~))*Code* or ((~~any~~)) other pertinent laws or ordinances. ((~~No permit presuming to give authority to violate or cancel the provisions of this code shall be valid, except insofar as the work or use it authorizes is lawful.~~

~~The issuance of a permit based upon plans shall~~))

(2) not prevent the authority having jurisdiction from later requiring the correction((~~s~~) 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. ((~~The issuance of a permit based upon plans shall not be construed as permitting violations of this code or of any other ordinance of the City.~~))

((~~The issuance of an electrical permit shall~~))

(3) not prevent the authority having jurisdiction from requiring correction of conditions found to be in violation of this ((~~e~~))*Code* or any other ordinance of the City. ((~~The period of time for which a permit is issued shall~~))

(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. Permits and renewed permits shall expire one year from the date of issuance.

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Exception No.1: Initial permits for major construction projects that require more than one 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 three years.

Exception No.2: Permits that expire in less than one year may be issued where the authority having jurisdiction determines a shorter period is appropriate.

(2) Renewal. Permits may be renewed and renewed permits may be further renewed by the authority having jurisdiction provided the following conditions are met:

((~~a~~)) (1)Application for renewal shall be made within the thirty-day period immediately preceding the date of expiration of the permit;

((~~b~~)) (2) The work authorized by the permit has been started and is progressing at a rate approved by the authority having jurisdiction;

((~~c~~)) (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:

((~~i~~)) a. The authority having jurisdiction determines that the permit complies, or is modified to comply, with the code or codes in effect on the date of application ((~~for~~)) renewal; or

((~~ii~~)) b. The work authorized by the permit is substantially underway and progressing at a rate approved by the authority having jurisdiction. For the purpose of this Article

"substantially underway" means work that is being completed and inspected on a continuing basis.

Permits may also be renewed where commencement or completion of the work authorized by the permit ((~~was~~)) is delayed by litigation, appeals, strikes or other causes related to the work authorized by the permit, beyond the permit holder's control.

(3) Re-establishment. A new permit shall be required to complete work where a permit ((~~has~~)) expired and was not renewed.

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)((~~(b)~~)) and (2)((~~(c)~~)) of Section 80.52(D)(2) above.

(E) ((~~Suspension or~~))Revocation The authority having jurisdiction may, by written order, ((~~suspend or~~)) revoke a permit issued under the provisions of this ((~~c~~))*Code* whenever the permit is issued in error or on the basis of false or misleading information((~~incorrect information~~)), or in violation of any ordinance or regulation or any provision of this ((~~c~~))*Code*.

(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, or

(b) The permit was issued in error or obtained with false or misleading information.

(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

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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 on the owner of the property on which the work is occurring, the holder of a permit if different than the owner, and the person doing or causing the work to be done. The notice of revocation shall be served in the manner set forth in RCW 4.28.080 for service of a summons or sent by first class mail to the last known address of the responsible party. For purposes of this Section, service is complete at the time of personal service, or if mailed, three days after the date of mailing. When the last day of the period so computed is a Saturday, Sunday or City holiday, the period runs until five 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.

(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 aggrieved by or interested in 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;

(2) Withdraw the notice of revocation;

(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 appellants shall be bound by the order.

(F) Permit for Temporary Installations. The authority having jurisdiction may issue a nonrenewable permit((s)) for temporary electrical installations for use during the construction of

buildings or for carnivals, conventions, festivals, fairs, the holding of religious services, temporary lighting of streets and the like if it is found that life or property will not be jeopardized.

Permission to use a temporary installation shall be granted for no longer than six 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. Should temporary lighting be over the street area, proper authority for use of the street shall first be obtained from the Seattle Department of Transportation. All temporary installations shall comply with all other requirements of this ((~~e~~))*Code*.

80.53 Permit Fees. A fee for each electrical permit and for other activities related to the enforcement of this ((~~e~~))*Code* shall be paid as set forth in the Fee Subtitle.

80.54 Inspections.

(A) General. 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.

(B) Inspection Requests. ((~~It shall be the duty of t~~)) 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 ((~~to~~))shall notify the authority having jurisdiction that work as specified in this section is ready for inspection. 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.

It shall be the duty of the permit holder and of the person requesting any inspections required by this ((~~e~~))*Code* to 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. Neither the authority having jurisdiction nor the City ((~~shall be~~)) is liable for any expense ((~~entailed~~)) incurred in the required removal or replacement of any material to allow inspection.

(C) Inspection Record. Work requiring a permit shall not be commenced until the permit holder or the permit holder's agent has posted an inspection record in a conspicuous place on the premises and in a position 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.

(D) Approvals Required. No work shall be done on any part of the building or structure beyond the point indicated in each successive inspection without first obtaining the written approval of the authority having jurisdiction. Written approval shall be given only after an inspection has been made of each successive step in the construction as indicated by each of the inspections required in Section 80.54(E) below.

Approval as a result of an inspection is not an approval of any violation of the provisions of this ((~~e~~))*Code* or of other pertinent laws and ordinances of the City. Inspection presuming to give authority to violate or cancel the provisions of this ((~~e~~))*Code* or of other pertinent laws and ordinances of the City are not valid.

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(E) Required Inspections.

(1) Cover Inspection. The authority having jurisdiction is authorized to conduct cover inspections when all of 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, and;

(b) Electrical ((~~E~~))equipment grounding (boxes, equipment, conductors and provisions for grounding receptacles, etc.) for all systems shall be completely made-up.

(c) For conduit systems, after all conduit has been installed and properly secured to the structure.

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

(F) Other Inspections. In addition to the called 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 ((~~e~~))*Code* and other laws enforced by the authority having jurisdiction.

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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 the Fee Subtitle.

(G) Reinspections. The authority having jurisdiction is authorized to conduct a reinspection when work is not complete, corrections not made, the approved plans are not readily available to the inspector, for failure to provide access on the date for which inspection is requested, or when deviations from plans that require the approval of the authority having jurisdiction have been made without proper approval.

For the purpose of determining compliance with Section 80.4(C) Maintenance, the authority having jurisdiction or the fire chief may cause any structure to be reinspected.

The authority having jurisdiction may assess a reinspection fee as set forth in the Fee Subtitle 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.

***

Section 4. The following sections of Article 90 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 90

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Introduction

90.1 ((~~Purpose.~~)) Reserved.

((~~**(A) Practical Safeguarding.** The purpose of this Code is the practical safeguarding of persons and property from hazards arising from the use of electricity.~~))

~~**(B) Adequacy.** This *Code* contains provisions that are considered necessary for safety. Compliance therewith and proper maintenance results in an installation that is essentially free from hazard but not necessarily efficient, convenient, or adequate for good service or future expansion of electrical use.~~

~~FPN: Hazards often occur because of overloading of wiring systems by methods or usage not in conformity with this *Code*. This occurs because initial wiring did not provide for increases in the use of electricity. An initial adequate installation and reasonable provisions for system changes provide for future increases in the use of electricity.~~

~~**(C) Intention.** This *Code* is not intended as a design specification or an instruction manual for untrained persons.~~

~~**(D) Relation to Other International Standards.** The requirements in this *Code* address the fundamental principles of protection for safety contained in Section 131 of International Electrotechnical Commission Standard 60364-1, *Electrical Installations of Buildings*.~~

~~FPN: IEC 60364-1, Section 131, contains fundamental principles of protection for safety that encompass protection against electric shock, protection against thermal effects, protection against overcurrent, protection against fault currents, and protection against overvoltage. All of these potential hazards are addressed by the requirements in this Code.~~))

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90.2 ((~~Scope.~~)) Reserved.

((~~**(A) Covered.** This *Code* covers the installation of electrical conductors, equipment, and raceways; signaling and communications conductors, equipment, and raceways; and optical fiber cables and raceways for the following:~~

~~(1) Public and private premises, including buildings, structures, mobile homes, recreational vehicles, and floating buildings~~

~~(2) Yards, lots, parking lots, carnivals, and industrial substations~~

~~(3) Installations of conductors and equipment that connect to the supply of electricity~~

~~(4) Installations used by the electric utility, such as office buildings, warehouses, garages, machine shops, and recreational buildings, that are not an integral part of a generating plant, substation, or control center.~~

~~**(B) Not Covered.** This *Code* does not cover the following:~~

~~(1) Installations in ships, watercraft other than floating buildings, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles~~

~~FPN: Although the scope of this *Code* indicates that the *Code* does not cover installations in ships, portions of this Code are incorporated by reference into Title 46, *Code of Federal Regulations*, Parts 110–113.~~

~~(2) Installations underground in mines and self-propelled mobile surface mining machinery and its attendant electrical trailing cable~~

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~~(3) Installations of railways for generation, transformation, transmission, or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communications purposes~~

~~(4) Installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations~~

~~(5) Installations under the exclusive control of an electric utility where such installations~~

~~a. Consist of service drops or service laterals, and associated metering, or~~

~~b. Are located in legally established easements or rights-of-way designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations, or~~

~~c. Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy.~~

~~FPN to (4) and (5): Examples of utilities may include those entities that are typically designated or recognized by governmental law or regulation by public service/utility commissions and that install, operate, and maintain electric supply (such as generation, transmission, or distribution systems) or communication systems (such as telephone, CATV, Internet, satellite, or data services). Utilities may be subject to compliance with codes and standards covering their regulated activities as adopted under governmental law or regulation. Additional information can be found through consultation with the appropriate governmental~~

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~~bodies, such as state regulatory commissions, the Federal Energy Regulatory Commission, and the Federal Communications Commission.~~))

~~(C) **Special Permission.** The authority having jurisdiction for enforcing this *Code* may grant exception for the installation of conductors and equipment that are not under the exclusive control of the electric utilities and are used to connect the electric utility supply system to the service-entrance conductors of the premises served, provided such installations are outside a building or terminate immediately inside a building wall.~~))

***

Section 5. The following sections of Article 100 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 100

Definitions

***

Scope. This article contains only those definitions essential to the proper application of this *Code*. It is not intended to include commonly defined general terms or commonly defined technical terms from related codes ((~~and~~))or standards. In general, only those terms that are used in two or more articles are defined in Article 100. Other definitions are included in the article in which they are used but may be referenced in Article 100.

Part I of this article contains definitions intended to apply wherever the terms are used throughout this *Code*. Part II contains definitions applicable only to the parts of articles specifically covering installations and equipment operating at over 600 volts, nominal.

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Terms or phrases used ((~~in this *Code*~~)) but not defined in this *Code* shall be as defined in the *Seattle Building Code* or the *Seattle Mechanical Code.*

FPN: WAC 296-46B-100, which includes additional terms and definitions, is by this reference made part of the 2008 *Seattle Electrical Code.*

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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.~~)) The Department of Planning and Development is authorized to administer and enforce this *Code*. The Department is under the administration and operational control of the Director, who is the *authority having jurisdiction.*

FPN: The Director may designate deputies, officers, inspectors, assistants and other persons to carry out the functions of the authority having jurisdiction as permitted in Article 80.

((~~FPN: 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.~~))

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Service Point. The point of connection between the facilities of the serving utility and the premises wiring. For requirements for service point connections, see Section 230.12.

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.

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Section 6. The following sections of Article 110 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 110

Requirements for Electrical Installations

***

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

FPN: See 90.7, Examination of Equipment for Safety, and 110.3, Examination, Identification, Installation, and Use of Equipment. See definitions of *Approved, Identified, Labeled, and Listed.*

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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.

FPN No. 1: See 300.6 for protection against corrosion.

FPN 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 permanent damage from the weather during building construction.

FPN No. 3: See Table 110.20 for appropriate enclosure-type designations.

<u>FPN No. 4: WAC 296-46B-110.011, which addresses requirements for electrical equipment and wiring submerged or exposed to water is by this reference made part of the 2008 Electrical Code.</u>

***

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 driven 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.

(2) Overcurrent Protection. Equipment containing overcurrent protection shall be placed so that the lowest possible overcurrent device is no less than one foot above the floor or working platform.

Exception: Supplementary overcurrent devices installed in listed utilization equipment.

FPN: See Chapter 10 of the *Seattle Building Code* for prohibitions of electrical equipment in exit enclosures.

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110.16 Flash Protection. Electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that are in other than dwelling occupancies, and are likely to require examination, adjustment, servicing, or maintenance while

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energized shall be field marked to warn qualified persons of potential electric arc flash hazards. The marking shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

FPN No. 1: NFPA 70E-2004, *Standard for Electrical Safety in the Workplace*, provides assistance in determining severity of potential exposure, planning safe work practices, and selecting personal protective equipment.

FPN No. 2: ANSI Z535.4-1998, *Product Safety Signs and Labels*, provides guidelines for the design of safety signs and labels for application to products.

FPN No. 3: WAC 296-46B-110.016 for flash protection markings is by this reference made part of the 2008 *Seattle Electrical Code.*

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110.21 Marking.

(A) Manufacturer's Marking. The manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified shall be placed on all electrical equipment. ((~~Other m~~)) 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.

(B) Marking or Labeling. Marking or labeling required in this *Code* shall be of sufficient durability to withstand the environment in which it is used. Unless otherwise required by this *Code*, both marking and labeling shall have lettering of not less than 6 mm (¼ in.) high and the

letters shall be in contrast to the background. Marking or labeling shall be affixed using of one of the following materials:

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

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

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

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110.22 Identification of Disconnecting Means.

(A) General. Each disconnecting means shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident. The marking shall be of sufficient durability to withstand the environment involved.

FPN: WAC 296-46B-110.022 for marking requirements is by this reference made part of the 2008 *Seattle Electrical Code.*

(B) Engineered Series Combination Systems. Where circuit breakers or fuses are applied in compliance with series combination ratings selected under engineering supervision and marked on the equipment as directed by the engineer, the equipment enclosure(s) shall be legibly marked

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in the field to indicate the equipment has been applied with a series combination rating. The marking shall be readily visible and state the following:

CAUTION — ENGINEERED SERIES COMBINATION

SYSTEM RATED _____ AMPERES.

IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.

FPN: See 240.86(A) for engineered series combination systems.

(C) Tested Series Combination Systems. Where circuit breakers or fuses are applied in compliance with the series combination ratings marked on the equipment by the manufacturer, the equipment enclosure(s) shall be legibly marked in the field to indicate the equipment has been applied with a series combination rating. The marking shall be readily visible and state the following:

CAUTION — SERIES COMBINATION SYSTEM RATED ____ AMPERES.

IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.

FPN: See 240.86(B) for tested series combination systems.

110.23 Current Transformers. Unused current transformers associated with potentially energized circuits shall be short-circuited.

110.24 Electrified Fences. Electrified fences, associated equipment and similar devices shall be permitted only by special permission from the authority having jurisdiction.

II. 600 Volts, Nominal, or Less

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110.26 Spaces About Electrical Equipment. Sufficient access and working space shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment.

(A) Working Space. Working space for equipment operating at 600 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), and (A)(3) or as required or permitted elsewhere in this *Code*.

(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.

Table 110.26(A)(1) Working Spaces

***

(a) *Dead-Front Assemblies.* Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards 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.

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(c) *Existing Buildings.* In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, 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 the height required by 110.26(E). Within the height requirements of this section, other equipment that is associated with the electrical installation and is located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment.

(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.

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(2) Large Equipment. For equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high at each end of the working space.

A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C)(2)(a) or (C)(2)(b) is met.

(a) *Unobstructed Egress.* Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.

(b) *Extra Working Space.* Where the depth of the working space is twice that required by 110.26(A)(1), a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.

(3) Personnel Doors. Where equipment rated 1200 A or more that contains overcurrent devices, switching devices, or control devices is installed and there is a personnel door(s) intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the door(s) shall open in the direction of egress and be equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressure.

(D) Illumination. Illumination shall be provided for all working spaces about service equipment, switchboards, panelboards, or motor control centers installed indoors. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as

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permitted by 210.70(A)(1), Exception No. 1, for switched receptacles. In electrical equipment rooms, the illumination shall not be controlled by automatic means only.

In residential installations, illumination shall be provided for all working spaces where panelboards are installed outdoors.

(E) Headroom. The minimum headroom of working spaces about service equipment, switchboards, panelboards, or motor control centers shall be 2.0 m (6½ ft). Where the electrical equipment exceeds 2.0 m (6½ ft) in height, the minimum headroom shall not be less than the height of the equipment.

((~~*Exception: In existing dwelling units, service equipment or panelboards that do not exceed 200 amperes shall be permitted in spaces where the headroom is less than 2.0 m (6½ ft).*~~))

(F) Dedicated Equipment Space. All switchboards, panelboards, distribution boards, 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(F)(1)(a) through (F)(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.

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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(F)(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 electrical equipment shall be installed in suitable enclosures and shall be protected from accidental contact by unauthorized personnel, or by vehicular traffic, or by accidental spillage or leakage from piping systems. 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.

(G) 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.

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III. Over 600 Volts, Nominal

110.30 General. Conductors and equipment used on circuits over 600 volts, nominal, shall comply with Part I of this article and with 110.30 through 110.40, which supplement or modify

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Part I. In no case shall the provisions of this part apply to equipment on the supply side of the service point.

FPN: WAC 296-46B-110.030 for cable marking requirements is by this reference made part of the 2008 *Seattle Electrical Code.*

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Section 7. The following sections of Article 210 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 210

Branch Circuits

***

210.8 Ground-Fault Circuit-Interrupter Protection for Personnel.

FPN: See 215.9 for ground-fault circuit-interrupter protection for personnel on feeders.

(A) Dwelling Units. All 125-volt, single-phase, 15- and 20-ampere receptacles installed in the locations specified in (1) through (8) shall have ground-fault circuit-interrupter protection for personnel.

(1) Bathrooms

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

Exception to (2): Receptacles for electrical equipment that are not readily accessible.

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FPN: WAC 296-46B-210.008(A)(1) which address requirements for fire alarm outlets in garages, is by this reference made part of the 2008 Electrical Code.

(3) Outdoors

Exception to (3): Receptacles that are not readily accessible and are supplied by a dedicated branch circuit for electric snow-melting or deicing equipment shall be permitted to be installed in accordance with 426.28.

(4) Crawl spaces — at or below grade level

(5) Unfinished basements — for purposes of this section, unfinished basements are defined as portions or areas of the basement not intended as habitable rooms and limited to storage areas, work areas, and the like

Exception to (5): A receptacle supplying only a permanently installed fire alarm or burglar alarm system shall not be required to have ground-fault circuit-interrupter protection.

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

Receptacles installed under the exception to 210.8(A)(5) shall not be considered as meeting the requirements of 210.52(G).

(6) Kitchens and Wet bars — where the receptacles are installed to serve the countertop surfaces

(7) ((~~Laundry, utility, and wet bar~~))All other sinks — where the receptacles are installed within 1.8 m (6 ft) of the outside edge of the sink

(8) Boathouses

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(B) Other Than Dwelling Units. All 125-volt, single-phase, 15- and 20-ampere receptacles installed in the locations specified in (1) through ((~~(5)~~))(8) shall have ground-fault circuit-interrupter protection for personnel:

(1) Bathrooms

(2) Kitchens

(3) Rooftops

(4) Outdoors

Exception No. 1 to (3) and (4): Receptacles that are not readily accessible and are supplied from a dedicated branch circuit for electric snow-melting or deicing equipment shall be permitted to be installed without GFCI protection.

Exception No. 2 to (4): In industrial establishments only, where the conditions of maintenance and supervision ensure that only qualified personnel are involved, an assured equipment grounding conductor program as specified in 590.6(B)(2) shall be permitted for only those receptacle outlets used to supply equipment that would create a greater hazard if power is interrupted or having a design that is not compatible with GFCI protection.

(5) Sinks — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the sink.

Exception No. 1 to (5): In industrial laboratories, receptacles used to supply equipment where removal of power would introduce a greater hazard shall be permitted to be installed without GFCI protection.

Exception No. 2 to (5): For receptacles located in patient care areas of health care facilities other than those covered under 210.8(B)(1), GFCI protection shall not be required.

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(6) Countertops and work surfaces where food and beverage preparation occurs

(7) Wet locations and receptacles that serve wet locations

(8) Crawl spaces – at or below grade level

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

***

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

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

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

(C) Dwelling Units.

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

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

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

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

FPN: WAC 296-46B-210.011(3), which address unfinished space requirements, is by this reference made a part of this 2008 *Seattle Electrical Code.*

FPN: See Examples D1(a), D1(b), D2(b), and D4(a) in Annex D.

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210.25 Branch Circuits in Buildings with More Than One Occupancy.

(A) Dwelling Unit Branch Circuits. Branch circuits in each dwelling unit shall supply only loads within that dwelling unit or loads associated only with that dwelling unit.

(B) Common Area Branch Circuits. Branch circuits required for the purpose of lighting, central alarm, signal, communications, or other needs for public or common areas of a two-

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family dwelling, a multifamily dwelling, or a multi-occupancy building shall not be supplied from equipment that supplies an individual dwelling unit or tenant space.

FPN: WAC 296-46B-210.25 requirements for common area branch circuits for shared septic or water well systems is by this reference made part of the 2008 *Seattle Electrical Code*.

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

(1) Part of a luminaire or appliance, or

(2) Controlled by a wall switch in accordance with 210.70(A)(1), Exception No. 1, or

(3) Located within cabinets or cupboards, or

(4) Located more than 1.7 m (5½ ft) above the floor

Permanently installed electric baseboard heaters equipped with factory-installed receptacle outlets or outlets provided as a separate assembly by the manufacturer shall be permitted as the required outlet or outlets for the wall space utilized by such permanently installed heaters. Such receptacle outlets shall not be connected to the heater circuits.

FPN: Listed baseboard heaters include instructions that may not permit their installation below receptacle outlets.

(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

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outlets shall be installed in accordance with the general provisions specified in 210.52(A)(1) through (A)(3).

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

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

(1) Any space 600 mm (2 ft) or more in width (including space measured around corners) and unbroken along the floor line by doorways, fireplaces, and similar openings

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

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

FPN: WAC 296-46B-210.052(A)(2)(6), addressing window seating, cabinet and bookcase requirements, is by this reference made part of the 2008 *Seattle Electrical Code.*

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

(B) Small Appliances.

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

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

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Exception No. 2: The receptacle outlet for refrigeration equipment shall be permitted to be supplied from an individual branch circuit rated 15 amperes or greater.

(2) No Other Outlets. The two or more small-appliance branch circuits specified in 210.52(B)(1) shall have no other outlets.

Exception No. 1: A receptacle installed solely for the electrical supply to and support of an electric clock in any of the rooms specified in 210.52(B)(1).

Exception No. 2: Receptacles installed to provide power for supplemental equipment and lighting on gas-fired ranges, ovens, or counter-mounted cooking units.

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

(C) Countertops. In kitchens, pantries, breakfast rooms, dining rooms, and similar areas of dwelling units, receptacle outlets for countertop spaces shall be installed in accordance with 210.52(C)(1) through (C)(5).

Where a range, counter-mounted cooking unit, or sink is installed in an island or peninsular countertop and the width of the countertop behind the range, counter-mounted cooking unit, or sink is less than 300 mm (12 in.), the range, counter-mounted cooking unit, or sink is considered

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to divide the countertop space into two separate countertop spaces as defined in 210.52(C)(4). Each separate countertop space shall comply with the applicable requirements in 210.52(C).

(1) Wall Countertop Spaces. A receptacle outlet shall be installed at each wall countertop space that is 300 mm (12 in.) or wider. Receptacle outlets shall be installed so that no point along the wall line is more than 600 mm (24 in.) measured horizontally from a receptacle outlet in that space.

Exception: Receptacle outlets shall not be required on a wall directly behind a range, counter-mounted cooking unit, or sink in the installation described in Figure 210.52(C)(1).

Figure 210.52(C)(1).

***

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

(3) Peninsular Countertop Spaces. At least one receptacle outlet shall be installed at each peninsular countertop space with a long dimension of 600 mm (24 in.) or greater and a short dimension of 300 mm (12 in.) or greater. A peninsular countertop is measured from the connecting edge.

(4) Separate Spaces. Countertop spaces separated by rangetops, refrigerators, or sinks shall be considered as separate countertop spaces in applying the requirements of 210.52(C)(1), (C)(2), and (C)(3).

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(5) Receptacle Outlet Location. Receptacle outlets shall be located above, but not more than 500 mm (20 in.) above, the countertop. Receptacle outlets rendered not readily accessible by appliances fastened in place, appliance garages, sinks, or rangetops as covered in 210.52(C)(1), Exception, or appliances occupying dedicated space shall not be considered as these required outlets

Exception to (5): To comply with the conditions specified in (1) or (2), receptacle outlets shall be permitted to be mounted not more than 300 mm (12 in.) below the countertop. Receptacles mounted below a countertop in accordance with this exception shall not be located where the countertop extends more than 150 mm (6 in.) beyond its support base.

(1) Construction for the physically impaired

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

FPN: WAC 296-46B-210.052(B)(8) which addresses receptacle outlets in appliance garages that may be counted as countertop outlet is by this reference made part of the 2008 *Seattle Electrical Code.*

(D) Bathrooms. In dwelling units, at least one receptacle outlet shall be installed in bathrooms within 900 mm (3 ft) of the outside edge of each basin. The receptacle outlet shall be located on a wall or partition that is adjacent to the basin or basin countertop, or installed on the side or face of the basin cabinet not more than 300 mm (12 in.) below the countertop.

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(E) Outdoor Outlets. Outdoor receptacle outlets shall be installed in accordance with (E)(1) through (E)(3). *[See 210.8(A)(3).]*

(1) One-Family and Two-Family Dwellings. For a one-family dwelling and each unit of a two-family dwelling that is at grade level, at least one receptacle outlet accessible while standing at grade level and located not more than 2.0 m (6½ ft) above grade 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 accessible from grade level and not more than 2.0 m (6½ ft) above grade shall be installed.

(3) Balconies, Decks, and Porches. Balconies, decks, and porches that are accessible from inside the dwelling unit shall have at least one receptacle outlet installed within the perimeter of the balcony, deck, or porch. The receptacle shall not be located more than 2.0 m (6½ ft) above the balcony, deck, or porch surface.

Exception to (3): Balconies, decks, or porches with a<u>n</u>((~~usable~~)) area of less than 1.86 m^2 (20 ft^2) are not required to have a receptacle installed.

(F) Laundry Areas. In dwelling units, at least one receptacle outlet shall be installed for the laundry.

Exception No. 1: In a dwelling unit that is an apartment or living area in a multifamily building where laundry facilities are provided on the premises and are available to all building occupants, a laundry receptacle shall not be required.

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Exception No. 2: In other than one-family dwellings where laundry facilities are not to be installed or permitted, a laundry receptacle shall not be required.

(G) Basements and Garages. For a one-family dwelling, the following provisions shall apply:

(1) At least one receptacle outlet, in addition to those for specific equipment, shall be installed in each basement, in each attached garage, and in each detached garage with electric power.

(2) Where a portion of the basement is finished into one or more habitable rooms, each separate unfinished portion shall have a receptacle outlet installed in accordance with this section.

(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 hall length shall be considered the length along the centerline of the hall without passing through a doorway.

***

Section 8. The following sections of Article 215 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 215

Feeders

***

215.5 Diagrams of Feeders. If required by the authority having jurisdiction, a diagram showing feeder details shall be provided prior to the installation of the feeders. Such a diagram shall show the area in square feet of the building or other structure supplied by each feeder, the total

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calculated load before applying demand factors, the demand factors used, the calculated load after applying demand factors, and the size and type of conductors to be used.

FPN: The line drawing requirements from WAC 296-46B-215.005(1) is by this reference made part of the 2008 *Seattle Electrical Code*.

***

215.10 Ground-Fault Protection of Equipment. Each feeder disconnect rated 1000 amperes or more and installed on solidly grounded wye electrical systems of more than 150 volts to ground, but not exceeding 600 volts phase-to-phase, shall be provided with ground-fault protection of equipment in accordance with the provisions of 230.95.

Feeders equipped with ground fault protection shall be tested and inspected prior to being placed into service.

The testing shall verify that the system is installed and operates as required by 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.

FPN: For buildings that contain health care occupancies, see the requirements of 517.17.

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Exception No. 1: The provisions of 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: The provisions of this section shall not apply if ground-fault protection of equipment is provided on the supply side of the feeder and on the load side of any transformer supplying the feeder.

***

215.13 Panelboards. Panelboards, existing or installed in an individual unit of multifamily dwellings, shall be supplied by one feeder.

215.14 One Dwelling Unit Not to Be Supplied Through Another. Feeder conductors supplying electricity to an individual dwelling unit shall not pass through another dwelling unit.

***

Section 9. The following sections of Article 220 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 220

Branch-Circuit, Feeder, and Service Calculations

***

220.3 Application of Other Articles. In other articles applying to the calculation of loads in specialized applications, there are requirements provided in Table 220.3 that are in addition to, or modifications of, those within this article.

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Table 220.3 Additional Load Calculation References

Calculation	Article	Section (or Part)
Air-conditioning and refrigerating equipment, branch-circuit conductor sizing	440	Part IV
Cranes and hoists, rating and size of conductors	610	610.14
Electric welders, ampacity calculations	630	630.11, 630.31
Electrically driven or controlled irrigation machines	675	675.7(A), 675.22(A)
Electric vehicle outlets	220	220.54, 220.57
Electrified truck parking space	626	
Electrolytic cell lines	668	668.3(C)
Electroplating, branch-circuit conductor sizing	669	669.5
Elevator feeder demand factors	620	620.14
Fire pumps, voltage drop (mandatory calculation)	695	695.7
Fixed electric heating equipment for pipelines and vessels, branch-circuit sizing	427	427.4
Fixed electric space-heating equipment, branch-circuit sizing	424	424.3
Fixed outdoor electric deicing and snow-melting equipment, branch-circuit sizing	426	426.4
Industrial machinery, supply conductor sizing	670	670.4(A)
Marinas and boatyards, feeder and service load calculations	555	555.12
Mobile homes, manufactured homes, and mobile home parks, total load for determining power supply	550	550.18(B)
Mobile homes, manufactured homes, and mobile home parks, allowable demand factors for park electrical wiring systems	550	550.31
Motion picture and television studios and similar locations – sizing of feeder conductors for television studio sets	530	530.19
Motors, feeder demand factor	430	430.26
Motors, multimotor and combination-load equipment	430	430.25
Motors, several motors or a motor(s) and other load(s)	430	430.24
Over 600-volt branch-circuit calculations	210	210.19(B)
Over 600-volt feeder calculations	215	215.2(B)
Phase converters, conductors	455	455.6
Recreational vehicle parks, basis of calculations	551	551.73(A)

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Calculation	Article	Section (or Part)
Sensitive electrical equipment, voltage drop (mandatory calculation)	647	647.4(D)
Solar photovoltaic systems, circuit sizing and current	690	690.8
Storage-type water heaters	422	422.11(E)
Theaters, stage switchboard feeders	520	520.27
Calculation	Article	Section (or Part)

[a]See 220.14(J)

[b]See 22.14(K)

***

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

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

Exception: Occupancy Lighting Loads. In determining feeder and service entrance conductor sizes and equipment ratings, the currently adopted Washington State Energy Code with Seattle Amendments (Seattle Energy Code) Table 15-1, Unit Lighting Power Allowance, may be used in lieu of NEC Table 220.12.

Table 220.12 General Lighting Loads by Occupancy

***

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

Exception: *((~~Where reduced loading of the conductors results from units operating on duty-cycle, intermittently, or from all units not operating at the same time, the authority having jurisdiction may grant permission for feeder and service conductors to have an ampacity less than 100 percent, provided the conductors have an ampacity for the load so determined.~~))* *A demand factor of 75 percent of the installed heating capacity may be used in sizing service entrance and feeder equipment for dwelling, commercial and industrial occupancies when electric service is provided to four or more fixed space heaters, or electric furnaces sequentially controlled. These exceptions shall not apply when optional calculations allowed by Section 220.84 are used.*

***

220.53 Appliance Load — Dwelling Unit(s). It shall be permissible to apply a demand factor of 75 percent to the nameplate rating load of four or more appliances fastened in place, other than electric ranges, clothes dryers, space-heating equipment, or air-conditioning equipment, that are served by the same feeder or service in a one-family, two-family, or multifamily dwelling. For space heating equipment, see Section 220.51.

***

220.57 Electric Vehicle Outlet Load – Residential Occupancies. It shall be permissible to calculate the load for electric vehicle charging systems and outlet serving parking areas for

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residential occupancies in accordance with Table 220.57. The number of outlets these demand factors apply to shall be equal to the number of required parking spaces. If the size or rating of the vehicle charging system is unknown an amperage rating of 20 amps shall be assumed.

FPN No. 1: The calculated demand load for electric vehicle charging systems may be used in section IV, Optional Calculations.

FPN No. 2: See also Article 625.27, Installation Requirements for Outlets.

FPN No 3: Residential Occupancies are defined in Chapter 3 of the *Seattle Building Code.*

Table 220.57 Demand Factors for Electric Vehicle Outlets

Number of Electric Vehicle Outlets	Demand Factor (%)
Less than 4	50
4–8	45
9–11	33
12–17	24
18–19	22
20–21	20
22–23	19
24–25	18
26–27	17
28–29	16
Over 29	15

***

220.84 Multifamily Dwelling.

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

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

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(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.

(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.

Exception: The demand load of electric vehicle charging outlets calculated in accordance with Section 220.57 shall be permitted to be included in the dwelling unit loads using Table 220.84.

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

(1) 33 volt-amperes/m^2 or 3 volt-amperes/ft^2 for general lighting and general-use receptacles

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

(3) The nameplate rating of the following:

a. All appliances that are fastened in place, permanently connected, or located to be on a specific circuit

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

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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

Table 220.84 Optional Calculations — Demand Factors for Three or More Multifamily Dwelling Units

***

Section 10. The following sections of Article 225 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 225

Outside Branch Circuits and Feeders

***

225.17 Masts as Supports. Where a mast is used for the support of final spans of feeders or branch circuits, it shall be of adequate strength or be supported by braces or guys to withstand safely the strain imposed by the overhead drop. Where raceway-type masts are used, all raceway fittings shall be identified for use with masts. Only the feeder or branch-circuit conductors specified within this section shall be permitted to be attached to the feeder and/or branch-circuit mast.

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FPN: WAC 296-46B-230.028 regarding mast supports for feeders and branch circuits is by this reference made part of the 2008 *Seattle Electrical Code.*

***

225.32 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 be utilized.

FPN: WAC 296-46B-225.032 regarding the location of outside feeder disconnecting means is by this reference made part of the 2008 *Seattle Electrical Code.*

Exception No. 1: For installations under single management, where documented safe switching procedures are established and maintained for disconnection, and where the installation is monitored by qualified individuals, the disconnecting means shall be permitted to be located elsewhere on the premises.

Exception No. 2: For buildings or other structures qualifying under the provisions of Article 685, the disconnecting means shall be permitted to be located elsewhere on the premises.

Exception No. 3: For towers or poles used as lighting standards, the disconnecting means shall be permitted to be located elsewhere on the premises.

Exception No. 4: For poles or similar structures used only for support of signs installed in accordance with Article 600, the disconnecting means shall be permitted to be located elsewhere on the premises.

***

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Section 11. The following sections of Article 230 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 230

Services

230.1 ((~~Scope~~))General.

(A) Scope. This article covers service conductors and equipment for control and protection of services and their installation requirements.

FPN: See Figure 230.1.

(B) Service Requirements. The serving utility shall be consulted by the owner, the owner's agent or the contractor making the installation regarding service entrance location before installing equipment. Provisions for metering equipment, attachment of service drop, or for an underground service lateral shall be made at a location acceptable to the serving utility.

Figure 230.1 Services.

***

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.

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

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

(c) A termination or current transformer section of built, sectionalized service equipment that is used exclusively for the connection of the utility distribution system. This section

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must be fed from underground or concrete encased conduit and the service equipment must set directly on the floor or a concrete house keeping pad.

(2) A transformer vault within the building.

***

230.28 Service Masts as Supports. ((~~Where a service mast is used for the support of service-drop conductors, it shall be of adequate strength or be supported by braces or guys to withstand safely the strain imposed by the service drop. Where raceway-type service masts are used, all raceway fittings shall be identified for use with service masts. Only power service-drop conductors shall be permitted to be attached to a service mast.~~)) Service masts used to support service-drop conductors shall comply with the following:

(1) All raceway fittings shall be identified for use with service masts.

(2) Service masts shall be rigid steel galvanized conduit no smaller than 51 mm (2 in.).

(3) Service masts shall support only power service-drop conductors.

(4) Service-drops shall be attached to a bracket on the mast, or other approved structure located with 610 mm (24 in.) of the mast.

(5) Masts over 661 mm (26 in.) above the roof shall be rigidly supported with brackets or guy wires. The serving utility shall be consulted for bracket and guy wire requirements.

(6) Service conduits for mast type services shall be supported 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.

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(7) Openings where service conduits pass through the roof shall be made watertight with approved neoprene or lead flashings.

(8) Couplings shall be permitted only below the roofline and shall be below a point of support for the mast.

FPN: WAC 296-46B-230.028 which address mast supports for feeders and branch circuits is by this reference made part of the 2008 *Seattle Electrical Code*.

230.29 Supports over Buildings and Wires On or About Buildings or Structures Over Water. ((~~Service-drop conductors passing over a roof shall be securely supported by substantial structures. Where practicable, such supports shall be independent of the building.~~))

(A) All service entrance conductors for piers, docks, wharves and other structures over water shall terminate in a disconnecting means or service equipment at the street side or end of such structure, or as otherwise approved by the authority having jurisdiction.

Exception: When the vault for the utility transformer is located over water, a disconnecting means for the service entrance conductors shall be provided immediately outside the vault at a location acceptable to the authority having jurisdiction.

FPN: For utility service conductors on piers, docks or wharves, refer to "*Requirements for Electric Service Connection*" published by Seattle City Light.

(B) Service entrance conduit containing wires not protected by circuit breakers or switches and fuses shall follow and be supported on parapets or other walls and shall not be laid upon or across roofs.

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(C) All service entrance conduits in the Fire District shall terminate on the side of the building nearest to the lines or mains of the utility. The service shall not terminate over adjacent private property, and shall extend to the street or alley wall of the buildings. The Seattle Building Code defines "Fire District" in Section 401.2 and the boundaries are illustrated in Figure 401.2.

(D) Open wiring for service conductors shall contact the building at only one point except where the utility will agree to contact the building at more than one point.

(E) No wire access fittings or junction boxes of any type shall be permitted within 4.6 m (15 ft) of the ground level on street, alley or driveway margins.

***

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

230.34 Conversion to Underground Service or Increasing Existing Overhead Services. Where service for an existing single-family dwelling is converted to an underground service or where existing overhead services are increased, the following requirements shall be met:

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

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

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

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

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

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

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

IV. Service-Entrance Conductors

230.40 Number of Service-Entrance Conductor Sets. Each service drop or lateral shall supply only one set of service-entrance conductors.

Exception No. 1: A building with more than one occupancy shall be permitted to have one set of service-entrance conductors for each service, as defined in 230.2, run to each occupancy or group of occupancies.

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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 or lateral, one set of service-entrance conductors shall be permitted to supply each or several such service equipment enclosures.

Exception No. 3: A single-family dwelling unit and a separate structure shall be permitted to have one set of service-entrance conductors run to each from a single service drop or lateral.

Exception No. 4: A two-family dwelling or a multifamily dwelling 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).

FPN: WAC 296-46B-230.040(5), which addresses second or additional service conductor requirements is by this reference made part of the 2008 *Seattle Electrical Code.*

***

230.42 Minimum Size and Rating.

(A) General. The ampacity of the service-entrance conductors before the application of any adjustment or correction factors shall not be less than either (A)(1) or (A)(2). Loads shall be determined in accordance with Part III, IV, or V of Article 220, as applicable. Ampacity shall be determined from 310.15. The maximum allowable current of busways shall be that value for which the busway has been listed or labeled.

(1) The sum of the noncontinuous loads plus 125 percent of continuous loads

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(2) The sum of the noncontinuous load plus 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

(B) Specific Installations. In addition to the requirements of 230.42(A), the minimum ampacity for ungrounded conductors for specific installations shall not be less than the rating of the service disconnecting means specified in 230.79(A) through (D).

(C) Grounded Conductors. The grounded conductor shall not be smaller than the minimum size as required by 250.24(C).

FPN: WAC 296-46B-230.042 which address labeling of service equipment, is by this reference made part of the 2008 *Seattle Electrical Code*.

230.43 Wiring Methods for 600 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

(4) Intermediate metal conduit

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

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

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

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

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(9) Busways

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

(11) Rigid polyvinyl chloride conduit (schedule 40 minimum size)

(12) Cablebus

(13) Type MC cable that complies with Section 330.10(A)(11), with prior approval of the authority having jurisdiction

(14) Mineral-insulated, metal-sheathed cable

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

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

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.

Exception: Conductors, other than service-entrance conductors, shall be permitted to be installed in a cable tray with service-entrance conductors, provided a solid fixed barrier of a material compatible with the cable tray is installed to separate the service-entrance conductors from other conductors installed in the cable tray. Cable trays shall be identified with permanently affixed labels with the wording "Service-Entrance Conductors." The labels shall be

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located so as to be visible after installation and placed so that the service-entrance conductors may be readily traced through the entire length of the cable tray.

230.46 Spliced Conductors. Service-entrance conductors shall be permitted to be spliced or tapped in accordance with 110.14, 300.5(E), 300.13, and 300.15, only by special permission of the authority having jurisdiction.

230.50 Protection Against Physical Damage.

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

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

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

(1) Rigid metal conduit

(2) Intermediate metal conduit

(3) Schedule 80 PVC conduit

(4) ((~~Electrical metallic tubing~~)) Reserved.

(5) Other approved means

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

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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).

***

((~~**230.52 Individual Conductors Entering Buildings or Other Structures.** Where individual open conductors enter a building or other structure, they shall enter through roof bushings or through the wall in an upward slant through individual, noncombustible, nonabsorbent insulating tubes. Drip loops shall be formed on the conductors before they enter the tubes.~~))

***

230.54 Overhead Service Locations.

(A) Service Head. Service raceways shall be equipped with a service head at the point of connection to service-drop conductors. The service head shall comply with the requirement for fittings in 314.15.

(B) Service Cable Equipped with Service Head or Gooseneck. Service cables shall be equipped with a service head. The service head shall comply with the requirement for fittings in 314.15.

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 Attachment. Service heads and goosenecks in service-entrance cables shall be located above the point of attachment of the service-drop conductors to the building or other structure.

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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 cables shall be held securely in place.

(E) Separately Bushed Openings. Service heads shall have conductors of different potential brought out through separately bushed openings.

Exception: For jacketed multiconductor service 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 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-drop conductors and service-entrance 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.

FPN: Drawings E-101, E-102, and E-103 from WAC 296-46B-230 are by this reference made part of the 2008 *Seattle Electrical Code.*

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VI. Service Equipment — Disconnecting Means

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

(A) Location. The service disconnecting means shall be installed in accordance with 230.70(A)(1), (A)(2), ((~~and~~))(A)(3) and (A)(4).

(1) Readily Accessible Location. The service disconnecting means shall be installed at a readily accessible location either outside of a building or structure or inside nearest the point of entrance of the service conductors. Service disconnecting means shall be readily accessible, including after any subsequent building alterations or additions.

FPN: The inside and outside location requirements contained in WAC 296-46B-230.070(11) are by this reference made part of the 2008 Electrical Code.

(2) Bathrooms and Other Wet Locations. Service disconnecting means shall not be installed in bathrooms, toilet rooms, shower rooms, nor above washers, ranges, dryers, water heaters, sinks, plumbing fixtures or drain boards.

(3) Other Locations. Service disconnecting means shall not be installed in clothes closets, cupboards or attics, nor under or over stairways, or within any stairway enclosure.

Exception: In one- and two-family dwellings, service disconnecting means may be installed over a stairway landing that has no less than the clear working space required by this Code.

((~~(3)~~)) **(4) Remote Control.** Where a remote control devices(s) is used to actuate the service disconnecting means, the service disconnecting means shall be located in accordance with 230.70(A)(1).

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(B) Marking. Each service disconnect shall be permanently marked to identify it as a service disconnect.

(C) Suitable for Use. Each service disconnecting means shall be suitable for the prevailing conditions. Service equipment installed in hazardous (classified) locations shall comply with the requirements of Articles 500 through 517.

***

230.82 Equipment Connected to the Supply Side of Service Disconnect. Only the following equipment shall be permitted to be connected to the supply side of the service disconnecting means:

(1) ((~~Cable~~)) Existing installations of cable limiters or other current-limiting devices by special permission of the authority having jurisdiction.

(2) Meters and meter sockets nominally rated not in excess of 600 volts, provided 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 600 volts that have a short-circuit current rating equal to or greater than the available short-circuit current, provided 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.

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

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

(6) Solar photovoltaic systems, fuel cell systems, or interconnected electric power production sources.

(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) Current transformer cabinets shall contain only the main service conductors, metering equipment and secondary wiring. 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.

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(10) 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.

VII. Service Equipment — Overcurrent Protection

230.90 Where Required. Each ungrounded service conductor shall have overload protection.

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

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

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

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

FPN: WAC 296-46B-230.042(6) requirement for an identification plate is by this reference made part of the 2008 *Seattle Electrical Code.*

Exception No. 4: Overload protection for fire pump supply conductors shall comply with 695.4(B)(1).

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Exception No. 5: Overload protection for 120/240-volt, 3-wire, single-phase dwelling services shall be permitted in accordance with the requirements of 310.15(B)(6).

(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.

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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 600 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.

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(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. ((~~The test shall be conducted in accordance with instructions that shall be provided with the equipment. A written record of this test 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.

FPN 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.

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FPN No. 2: This added protective equipment at the service equipment may make it necessary to review the overall wiring system for proper selective overcurrent protection coordination. Additional installations of ground-fault protective equipment may be needed on feeders and branch circuits where maximum continuity of electric service is necessary.

FPN No. 3: Where ground-fault protection is provided for the service disconnect and interconnection is made with another supply system by a transfer device, means or devices may be needed to ensure proper ground-fault sensing by the ground-fault protection equipment.

FPN No. 4: See 517.17(A) for information on where an additional step of ground-fault protection is required for hospitals and other buildings with critical areas or life support equipment.

***

230.202 Service-Entrance Conductors. Service-entrance conductors to buildings or enclosures shall be installed to conform to 230.202(A) and (B).

(A) Conductor Size. Service-entrance conductors shall not be smaller than 6 AWG unless in multiconductor cable. Multiconductor cable shall not be smaller than 8 AWG.

(B) Wiring Methods. Service-entrance conductors shall be installed by one of the following wiring methods: ((~~covered in 300.37 and 300.50.~~))

(1) Rigid metal conduit

(2) Intermediate metal conduit

(3) Schedule 80 rigid polyvinyl chloride conduit

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(4) Busways

(5) Cablebus

(6) Cable trays only with prior permission of the authority having jurisdiction.

***

Section 12. The following sections of Article 240 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 240

Overcurrent Protection

***

240.24 Location in or on Premises.

(A) Accessibility. Overcurrent devices shall be readily accessible and shall be installed so that the center of the grip of the operating handle of the switch or circuit breaker, when in its highest position, is not more than 2.0 m (6 ft 7 in.) and no less than one foot 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 devices, as described in 225.40 and 230.92.

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

(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).

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(1) Service and Feeder Overcurrent Devices. Where electric service and electrical maintenance are provided by the building management and where these are under continuous building management supervision, the service overcurrent devices and feeder overcurrent devices supplying more than one occupancy shall be permitted to be accessible only to authorized management personnel in the following:

(1) Multiple-occupancy buildings

(2) Guest rooms or guest suites

(2) Branch-Circuit Overcurrent Devices. Where electric service and electrical maintenance are provided by the building management and where these are under continuous building management supervision, the branch-circuit overcurrent devices supplying any guest rooms or guest suites without permanent provisions for cooking shall be permitted to be accessible only to authorized management personnel.

(3) Accessory Dwelling Unit, Two-Family and Multi-family Occupancies. Branch circuit overcurrent devices shall be located either within the dwelling unit that they serve or in common areas accessible to all occupants.

(C) Not Exposed to Physical Damage. Overcurrent devices shall be located where they will not be exposed to physical damage.

FPN: See 110.11, Deteriorating Agents.

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

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(E) Not Located in Bathrooms. In dwelling units and guest rooms or guest suites of hotels and motels, overcurrent devices, other than supplementary overcurrent protection, shall not be located in bathrooms.

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

(G) Other Locations. Overcurrent protection devices, other than supplementary overcurrent protection, shall not be located in a shower room, cupboard, attic, nor above a washer, range, dryer, water heater, sink, plumbing fixture, drain board, or similar locations.

***

Section 13. The following sections of Article 250 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 250

Grounding and Bonding

***

250.56 Resistance of Rod, Pipe, and Plate Electrodes. A single electrode consisting of a rod, pipe, or plate ((~~that does not have a resistance to ground of 25 ohms or less~~)) shall be augmented by one additional electrode of any of the types specified by 250.52(A)(4) through (A)(8). Where 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.

FPN: The paralleling efficiency of rods longer than 2.5 m (8 ft) is improved by spacing greater than 1.8 m (6 ft).

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V. Bonding

250.90 General. Bonding shall be provided where necessary to ensure electrical continuity and the capacity to conduct safely any fault current likely to be imposed.

FPN: WAC 296-46B-250.090(6) & (7), which addresses requirements for bonding in plumbing systems or lines, is by this reference made part of the 2008 *Seattle Electrical Code.*

250.92 Services.

(A) Bonding of Services. The non–current-carrying metal parts of equipment indicated in 250.92(A)(1) and (A)(2) shall be bonded together.

(1) The service raceways, utility raceways that are metallically connected to other service equipment cable trays, cablebus framework, auxiliary gutters, or service cable armor or sheath except as permitted in 250.84

(2) All service enclosures containing service conductors, including meter fittings, boxes, or the like, interposed in the service raceway or armor

(B) Method of Bonding at the Service. Electrical continuity at service equipment, service raceways, and service conductor enclosures shall be ensured by one of the following methods:

(1) Bonding equipment to the grounded service conductor in a manner provided in 250.8

Exception: Connection to the grounded service conductor shall not be used to bond service terminals boxes and current transformer enclosures.

(2) Connections utilizing threaded couplings or threaded bosses on enclosures where made up wrenchtight

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(3) Threadless couplings and connectors where 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

Bonding jumpers meeting the other requirements of this article shall be used around concentric or eccentric knockouts that are punched or otherwise formed so as to impair the electrical connection to ground. Standard locknuts or bushings shall not be the sole means for the bonding required by this section.

***

250.104 Bonding of Piping Systems and Exposed Structural Steel.

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

(1) General. Metal water piping system(s) installed in or attached to a building or structure shall be bonded to the service equipment enclosure, the grounded conductor at the service, the grounding electrode conductor where of sufficient size, or to the one or more grounding electrodes used. The bonding jumper(s) shall be sized in accordance with Table 250.66 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

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piping, the metal water piping system(s) for each occupancy shall be permitted to be bonded to the equipment grounding terminal of the panelboard or switchboard enclosure (other than service equipment) supplying that occupancy. The bonding jumper shall be sized in accordance with Table 250.122, based on the rating of the overcurrent protective device for the circuit supplying the occupancy.

(3) Multiple Buildings or Structures Supplied by a Feeder(s) or Branch Circuit(s). The metal water piping system(s) installed in or attached to a building or structure shall be bonded to the building or structure disconnecting means enclosure where located at the building or structure, to the equipment grounding conductor run with the supply conductors, or to the one or more grounding electrodes used. The bonding jumper(s) shall be sized in accordance with 250.66, based on the size of the feeder or branch circuit conductors that supply the building. The bonding jumper shall not be required to be larger than the largest ungrounded feeder or branch circuit conductor supplying the building.

(B) Other Metal Piping. Where 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 the service equipment enclosure, the grounded conductor at the service, the grounding electrode conductor where of sufficient size, or the one or more grounding electrodes used. The bonding jumper(s) shall be sized in accordance with 250.122, using the rating of the circuit that is likely to energize the piping system(s). The equipment grounding conductor for the circuit that is likely to energize the piping shall be permitted to serve as the bonding means. The points of attachment of the bonding jumper(s) shall be accessible.

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Exception: Flexible gas piping shall be bonded to the grounding electrode system at any accessible location at the point where the flexible piping receives its supply. The bonding conductor connection shall not terminate on the flexible gas piping. The minimum size bonding conductor shall be #6 AWG copper or as required by the manufacturer's installation instructions.

FPN: Bonding all piping and metal air ducts within the premises will provide additional safety.

(C) Structural Metal. Exposed structural metal that is interconnected to form a metal building frame and is not intentionally grounded and is likely to become energized shall be bonded to the service equipment enclosure, the grounded conductor at the service, the grounding electrode conductor where of sufficient size, or the one or more grounding electrodes used. The bonding jumper(s) shall be sized in accordance with Table 250.66 and installed in accordance with 250.64(A), (B), and (E). The points of attachment of the bonding jumper(s) shall be accessible.

(D) Separately Derived Systems. Metal water piping systems and structural metal that is interconnected to form a building frame shall be bonded to separately derived systems in accordance with (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 available point of the metal water piping system(s) in the area served by each separately derived system. This connection shall be made at the same point on the separately derived system where the grounding electrode conductor is connected. Each bonding

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jumper shall be sized in accordance with Table 250.66 based on the largest ungrounded conductor of the separately derived system.

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

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

(2) Structural Metal. Where 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 250.66 based on the largest ungrounded conductor of the separately derived system.

Exception No. 1: A separate bonding jumper to the building structural metal shall not be required where the metal frame of a building or structure is used as the grounding electrode for the separately derived system.

Exception No. 2: A separate bonding jumper to the building structural metal shall not be required where the water piping of a building or structure is used as the grounding electrode for

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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. Where a common grounding electrode conductor is installed for multiple separately derived systems as permitted by 250.30(A)(4), and exposed structural metal that is interconnected to form the building frame or interior metal piping exists in the area served by the separately derived system, the metal piping and the structural metal member shall be bonded to the common grounding electrode conductor.

Exception: A separate bonding jumper from each derived system to metal water piping and to structural metal members shall not be required where the metal water piping and the structural metal members in the area served by the separately derived system are bonded to the common grounding electrode conductor.

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

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Section 14. The following sections of Article 300 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 300

Wiring Methods

I. General Requirements

300.1 Scope.

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(A) All Wiring Installations. This article covers wiring methods for all wiring installations unless modified by other articles.

FPN: WAC 296-46B-010(13) & (14), Tables 010-1 & 010-2, WAC 296-49B-900(1); and WAC Tables 900-1 and 900-2, which address, among other things, requirements for wiring methods for designated building occupancies are by this reference made part of the 2008 *Seattle Electrical Code.*

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

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

Table 300.1(C) Metric Designators and Trade Sizes

***

300.4 Protection Against Physical Damage. Where subject to physical damage, conductors shall be protected.

(A) Cables and Raceways Through Wood Members.

(1) Bored Holes. In both exposed and concealed locations, where a cable- or raceway-type wiring method is installed through bored holes in joists, rafters, or wood members, holes shall be bored so that the edge of the hole is not less than 32 mm (1¼ in.) from the nearest edge of the wood member. Where this distance cannot be maintained, the cable or raceway shall be protected

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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.

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.

FPN: WAC 296-46B-010(7) requires wiring and device boxes to have a minimum of 63 mm (2 ½ in.) clearance from the exterior surface of framing members; this WAC subsection is by this reference made part of the 2008 *Seattle Electrical Code.*

(2) Notches in Wood. Where there is no objection because of weakening the building structure, in both exposed and concealed locations, cables or raceways shall be permitted to be laid in notches in wood studs, joists, rafters, or other wood members where the cable or raceway at those points is protected against nails or screws by a steel plate at least 1.6 mm ($^1/_{16}$ in.) thick, and of appropriate length and width, installed to cover the area of the wiring. The steel plate shall be installed before the building finish is applied.

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

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

(B) Nonmetallic Cables and Electrical Nonmetallic Tubing Through Metal Framing Members.

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(1) Nonmetallic Cable.

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

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

(2) Nonmetallic-Sheathed Cable and Electrical Nonmetallic Tubing. Where nails or screws are likely to penetrate nonmetallic-sheathed cable or electrical nonmetallic tubing, a steel sleeve, steel plate, or steel clip not less than 1.6 mm ($^1/_{16}$ in.) in thickness shall be used to protect the cable or tubing.

Exception: A listed and marked steel plate less than 1.6 mm ($^1/_{16}$ in.) thick that provides equal or better protection against nail or screw penetration shall be permitted.

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

(D) Cables and Raceways Parallel to Framing Members and Furring Strips. In both exposed and concealed locations, where a cable- or raceway-type wiring method is installed parallel to

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framing members, such as joists, rafters, or studs, or is installed parallel to furring strips, the cable or raceway shall be installed and supported so that the nearest outside surface of the cable or raceway is not less than 32 mm (1¼ in.) from the nearest edge of the framing member or furring strips where nails or screws are likely to penetrate. Where this distance cannot be maintained, the cable or raceway shall be protected from penetration by nails or screws by a steel plate, sleeve, or equivalent at least 1.6 mm ($^{1}/_{16}$ in.) thick.

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

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

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

(E) Cables and Raceways Installed Under Roof Decking. A cable- or raceway-type wiring method, installed in exposed or concealed locations under metal-corrugated sheet roof decking, shall be installed and supported so the nearest outside surface of the cable or raceway is not less than 38 mm (1½ in.) from the nearest surface of the roof decking.

FPN: Roof decking material is often repaired or replaced after the initial raceway or cabling and roofing installation and may be penetrated by the screws or other mechanical devices

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designed to provide "hold down" strength of the waterproof membrane or roof insulating material.

Exception: Rigid metal conduit and intermediate metal conduit shall not be required to comply with 300.4(E).

(F) Cables and Raceways Installed in Shallow Grooves. Cable- or raceway- type wiring methods installed in a groove, to be covered by wallboard, siding, paneling, carpeting, or similar finish, shall be protected by 1.6 mm ($^1/_{16}$ in.) thick steel plate, sleeve, or equivalent or by not less than 32 mm (1¼ in.) free space for the full length of the groove in which the cable or raceway is installed.

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

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

(G) Insulated Fittings. Where raceways contain 4 AWG or larger insulated circuit conductors and these conductors enter a cabinet, box, enclosure, or raceway, the conductors shall be protected by a substantial fitting providing a smoothly rounded insulating surface, unless the conductors are separated from the fitting or raceway by substantial insulating material that is securely fastened in place.

Exception: Where threaded hubs or bosses that are an integral part of a cabinet, box, enclosure, or raceway provide a smoothly rounded or flared entry for conductors.

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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.

***

300.11 Securing and Supporting.

(A) Secured in Place. Raceways, cable assemblies, boxes, cabinets, and fittings shall be securely fastened in place. Support wires that do not provide secure support shall not be permitted as the sole support. Support wires and associated fittings that provide secure support and that are installed in addition to the ceiling grid support wires shall be permitted as the sole support. Where independent support wires are used, they shall be secured at both ends. Cables and raceways shall not be supported by ceiling grids.

FPN: WAC 296-46B-300.011 contains additional requirements for support of raceways, cables, or boxes in suspended ceilings; this WAC requirement is by this reference made part of the 2008 *Seattle Electrical Code.*

(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.

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Exception: The ceiling support system shall be permitted to support wiring and equipment that have been tested as part of the fire-rated assembly.

FPN: One method of determining fire rating is testing in accordance with NFPA 251-2006, *Standard Methods of Tests of Fire Resistance of Building Construction and Materials.*

(2) Non–Fire-Rated Assemblies. Wiring located within the cavity of a non–fire-rated floor–ceiling or roof–ceiling assembly shall not be secured to, or supported by, the ceiling assembly, including the ceiling support wires. An independent means of secure support shall be provided and shall be permitted to be attached to the assembly.

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.

(B) 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 for the purpose

(2) Where the raceway contains power supply conductors for electrically controlled equipment and is used to support Class 2 circuit conductors or cables that are solely for the purpose of connection to the equipment control circuits

(3) Where the raceway is used to support boxes or conduit bodies in accordance with 314.23 or to support luminaires in accordance with 410.36(E)

(C) 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.

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300.19 Supporting Conductors <u>and Cable Assemblies</u> in Vertical Raceways.

(A) Spacing Intervals — Maximum. Conductors <u>and cables</u> in vertical raceways shall be supported if the vertical rise exceeds the values in Table 300.19(A). One ((~~cable~~)) support shall be provided at the top of the vertical ((~~raceway~~)) <u>installation</u> or as close to the top as practical. Intermediate supports shall be provided as necessary to limit supported ((~~conductor~~)) lengths to not greater than those values specified in Table 300.19(A).

Exception: Steel wire armor cable shall be supported at the top of the riser with a cable support that clamps the steel wire armor. A safety device shall be permitted at the lower end of the riser to hold the cable in the event there is slippage of the cable in the wire-armored cable support. Additional wedge-type supports shall be permitted to relieve the strain on the equipment terminals caused by expansion of the cable under load.

(B) Fire-Rated Cables and Conductors. Support methods and spacing intervals for fire-rated cables and conductors shall comply with any restrictions provided in the listing of the electrical circuit protective system used and in no case shall exceed the values in Table 300.19(A).

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

(1) By clamping devices constructed of or employing insulating wedges inserted in the ends of the raceways. Where clamping of insulation does not adequately support the cable, the conductor also shall be clamped.

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

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

(4) By a method of equal effectiveness.

***

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 through fire-resistant-rated walls, partitions, floors, or ceilings shall be firestopped using approved methods to maintain the fire resistance rating. <u>All out-of-service cable shall be removed from accessible ceiling spaces.</u>

FPN: 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

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usually applies between boxes installed on opposite sides of the wall. Assistance in complying with 300.21 can be found in building codes, fire resistance directories, and product listings.

***

Section 15. The following sections of Article 314 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 314

Outlet, Device, Pull, and Junction Boxes;

Conduit Bodies; Fittings; and Handhole Enclosures

I. Scope and General

314.1 Scope. This article covers the installation and use of all boxes and conduit bodies used as outlet, device, junction, or pull boxes, depending on their use, and handhole enclosures. Cast, sheet metal, nonmetallic, and other boxes such as FS, FD, and larger boxes are not classified as conduit bodies. This article also includes installation requirements for fittings used to join raceways and to connect raceways and cables to boxes and conduit bodies.

FPN: See Chapter 12 of the *Seattle Building Code* and Chapter 3 of the *Seattle Residential Code* for location of outlet boxes in sound transmission control assemblies.

***

Section 16. The following sections of Article 326 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 326

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Integrated Gas Spacer Cable: Type IGS

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

(1) ((~~Service-entrance conductors~~)) Reserved.

(2) Feeder or branch-circuit conductors

***

Section 17. The following sections of Article 330 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 330

Metal-Clad Cable: Type MC

***

II. Installation

330.10 Uses Permitted.

(A) General Uses. Type MC cable shall be permitted as follows:

(1) For ((~~services,~~)) feeders((~~,~~)) and branch circuits. Type MC cable may be used for services provided each of the following conditions are met:

a. Obtain prior approval of the authority having jurisdiction for the specific installation.

b. The metallic covering is impervious to moisture.

c. A lead sheath or moisture-impervious jacket is provided under the metal covering.

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d. The insulated conductors under the metallic covering are listed for use in wet locations and a corrosion-resistant jacket is provided over the metallic sheath.

(2) For power, lighting, control, and signal circuits

(3) Indoors or outdoors

(4) Exposed or concealed

(5) To be direct buried where identified for such use

(6) In cable tray where identified for such use

(7) In any raceway

(8) As aerial cable on a messenger

(9) In hazardous (classified) locations as permitted

(10) In dry locations and embedded in plaster finish on brick or other masonry except in damp or wet locations

(11) In wet locations where any of the following conditions are met:

a. The metallic covering is impervious to moisture.

b. A lead sheath or moisture-impervious jacket is provided under the metal covering.

c. The insulated conductors under the metallic covering are listed for use in wet locations and a corrosion-resistant jacket is provided over the metallic sheath.

(12) Where single-conductor cables are used, all phase conductors and, where used, the neutral conductor shall be grouped together to minimize induced voltage on the sheath.

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(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).

(1) Cable Tray. Type MC cable installed in cable tray shall comply with 392.3, 392.4, 392.6, and 392.8 through 392.13.

(2) Direct Buried. Direct-buried cable shall comply with 300.5 or 300.50, as appropriate.

(3) Installed as Service-Entrance Cable. Type MC cable installed as service-entrance cable shall be permitted in accordance with 230.43.

(4) Installed Outside of Buildings or Structures or as Aerial Cable. Type MC cable installed outside of buildings or structures or as aerial cable shall comply with 225.10, 396.10, and 396.12.

FPN: The "Uses Permitted" is not an all-inclusive list.

***

Section 18. The following sections of Article 334 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 334

Nonmetallic-Sheathed Cable:

Types NM, NMC, and NMS

***

II. Installation

334.10 Uses Permitted. Type NM, Type NMC, and Type NMS cables shall be permitted to be used in the following:

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(1) One- and two-family dwellings.

(2) Multifamily dwellings ((~~permitted to be~~)) of Types III, IV, and V construction except as prohibited in 334.12. Cables shall be concealed within walls, floors, or ceilings that provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies.

(3) Other structures ((~~permitted to be~~)) of Types III, IV, and V construction except as prohibited in 334.12. Cables shall be concealed within walls, floors, or ceilings that provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies.

FPN((~~No. 1~~)): Types of building construction and occupancy classifications are defined in ((~~NFPA 220-2006, *Standard on Types of Building Construction*, or the applicable building code, or both~~)) the *Seattle Building Code*.

((~~FPN No. 2: See Annex E for determination of building types [NFPA 220, Table 3-1].~~))

(4) Cable trays in structures permitted to be Types III, IV, or V where the cables are identified for the use and the installation is not prohibited by 334.12.

FPN: See 310.10 for temperature limitation of conductors.

(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:

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

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

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

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

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

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

***

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

(A) ((~~**To Follow Surface.** Cable shall closely follow the surface of the building finish or of running boards.~~))**Work Considered as Concealed.** Nonmetallic-sheathed cable shall be considered as concealed where installed in inaccessible void areas of buildings or where run between or through bored holes of studs, joists and similar members as required in Section 300.4. All outlet, junction or device boxes shall be installed as required for concealed work.

(B) Protection from Physical Damage. Cable shall be protected from physical damage where necessary by rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC conduit, or other approved means. ((~~Where passing through a floor, the cable shall be~~

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~~enclosed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC conduit, or other approved means extending at least 150 mm (6 in.) above the floor.~~))

Type NMC cable installed in shallow chases or grooves in masonry, concrete, or adobe, shall be protected in accordance with the requirements in 300.4(F) and covered with plaster, adobe, or similar finish.

Exception: Exposed nonmetallic-sheathed cable that is properly supported may enter the top section only of a surface-mounted main service panel where the distance from the top of the panel to the bottom of the ceiling joist above does not exceed 2 ½ feet.

(C) In Unfinished Basements((~~**and Crawl Spaces**~~)). Where cable is run at angles with joists in unfinished basements((~~and crawl spaces~~)), it shall be((~~permissible to secure cables not smaller than two 6 AWG or three 8 AWG conductors directly to the lower edges of the joists. Smaller cables shall be~~)) run ((~~either~~)) through bored holes in joists((~~or on running boards~~)). NM cable installed on the wall of an unfinished basement shall be ((~~permitted to be~~)) installed in a listed conduit or tubing((~~or shall be protected in accordance with 300.4~~)). Conduit or tubing shall be provided with a suitable insulating bushing or adapter at the point the cable enters the raceway. The NM cable sheath shall extend through the conduit or tubing and into the outlet or device box not less than 6 mm (¼ in.). The cable shall be secured within 300 mm (12 in.) of the point where the cable enters the conduit or tubing. Metal conduit, tubing, and metal outlet boxes shall be connected to an equipment grounding conductor.

(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

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joists. For the purpose of this section, "crawl space" is defined as any unoccupied space of limited height, usually less than a full story but of sufficient height to permit workers access to otherwise concealed ductwork, piping, or wiring, and the space is usually enclosed by a foundation wall.

***

334.40 Boxes and Fittings.

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

(B) ((~~**Devices of Insulating Material.** Switch, outlet, and tap devices of insulating material shall be permitted to be used without boxes in exposed cable wiring and for rewiring in existing buildings where the cable is concealed and fished. Openings in such devices shall form a close fit around the outer covering of the cable, and the device shall fully enclose the part of the cable from which any part of the covering has been removed. Where connections to conductors are by binding-screw terminals, there shall be available as many terminals as conductors.~~)) Reserved.

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

***

Section 19. The following sections of Article 338 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 338

Service-Entrance Cable:

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Types SE and USE

***

II. Installation

338.10 Uses Permitted.

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

(B) Branch Circuits or Feeders.

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

(2) Grounded Conductor Not Insulated. 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: Uninsulated conductors shall be permitted as a grounded conductor in accordance with 250.32 and 250.140 where the uninsulated grounded conductor of the cable originates in service equipment, and 225.30 through 225.40.

(3) Temperature Limitations. Type SE service-entrance cable used to supply appliances shall not be subject to conductor temperatures in excess of the temperature specified for the type of insulation involved.

(4) Installation Methods for Branch Circuits and Feeders.

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

FPN: See 310.10 for temperature limitation of conductors.

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

338.12 Uses Not Permitted.

(A) Service-Entrance Cable. Service-entrance cable (SE) shall not be used under the following conditions or in the following locations:

(1) Where subject to physical damage unless protected in accordance with 230.50(A)

(2) Underground with or without a raceway

(3) For exterior branch circuits and feeder wiring unless the installation complies with the provisions of Part I of Article 225 and is supported in accordance with 334.30 or is used as messenger-supported wiring as permitted in Part II of Article 396

(4) As service entrance conductors.

(B) Underground Service-Entrance Cable. Underground service-entrance cable (USE) shall not be used under the following conditions or in the following locations:

(1) For interior wiring

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(2) For aboveground installations except where USE cable emerges from the ground and is terminated in an enclosure at an outdoor location and the cable is protected in accordance with 300.5(D)

(3) As aerial cable unless it is a multiconductor cable identified for use aboveground and installed as messenger-supported wiring in accordance with 225.10 and Part II of Article 396

(4) As service entrance conductors.

***

Section 20. The following sections of Article 358 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 358

Electrical Metallic Tubing:

Type EMT

II. Installation

358.10 Uses Permitted.

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

(B) Corrosion Protection. Ferrous or nonferrous EMT, elbows, couplings, and fittings shall be permitted to be installed in concrete, ((~~in direct contact with the earth,~~)) above grade or in areas subject to severe corrosive influences where protected by corrosion protection and judged suitable for the condition.

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(C) Wet Locations. All supports, bolts, straps, screws, and so forth shall be of corrosion-resistant materials or protected against corrosion by corrosion-resistant materials.

Circuits installed in electrical metallic tubing in wet locations shall use equipment grounding wires sized according to Section 250.122.

FPN: See 300.6 for protection against corrosion.

***

Section 21. The following sections of Article 382 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 382

Nonmetallic Extensions

Article 382 is not adopted.

((~~I. General~~

~~382.1 Scope. This article covers the use, installation, and construction specifications for nonmetallic extensions.~~

~~382.2 Definitions.~~

~~Concealable Nonmetallic Extension. A listed assembly of two, three, or four insulated circuit conductors within a nonmetallic jacket, an extruded thermoplastic covering, or a sealed nonmetallic covering. The classification includes surface extensions intended for mounting directly on the surface of walls or ceilings, and concealed with paint, texture, joint compound, plaster, wallpaper, tile, wall paneling, or other similar materials.~~

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~~Nonmetallic Extension. An assembly of two insulated conductors within a nonmetallic jacket or an extruded thermoplastic covering. The classification includes surface extensions intended for mounting directly on the surface of walls or ceilings.~~

~~382.6 Listing Requirements. Concealable nonmetallic extensions and associated fittings and devices shall be listed. The starting/source tap device for the extension shall contain and provide the following protection for all load-side extensions and devices.~~

~~(1) Supplementary overcurrent protection~~

~~(2) Level of protection equivalent to a Class A GFCI~~

~~(3) Level of protection equivalent to a portable GFCI~~

~~(4) Line and load-side miswire protection~~

~~(5) Provide protection from the effects of arc faults~~

~~II. Installation~~

~~382.10 Uses Permitted. Nonmetallic extensions shall be permitted only in accordance with 382.10(A), (B), and (C).~~

~~(A) From an Existing Outlet. The extension shall be from an existing outlet on a 15- or 20-ampere branch circuit. Where a concealable nonmetallic extension originates from a non-grounding-type receptacle, the installation shall comply with 250.130(C), 406.3(D)(3)(b), or 406.3(D)(3)(c).~~

~~(B) Exposed and in a Dry Location. The extension shall be run exposed, or concealed as permitted in 382.15, and in a dry location.~~

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~~(C) Residential or Offices. For nonmetallic surface extensions mounted directly on the surface of walls or ceilings, the building shall be occupied for residential or office purposes and shall not exceed three floors abovegrade. Where identified for the use, concealable nonmetallic extensions shall be permitted more than three floors abovegrade.~~

~~FPN No. 1: See 310.10 for temperature limitation of conductors.~~

~~FPN No. 2: See 362.10 for definition of First Floor.~~

~~382.12 Uses Not Permitted. Nonmetallic extensions shall not be used as follows:~~

~~(1) In unfinished basements, attics, or roof spaces~~

~~(2) Where the voltage between conductors exceeds 150 volts for nonmetallic surface extensions and 300 volts for aerial cable~~

~~(3) Where subject to corrosive vapors~~

~~(4) Where run through a floor or partition, or outside the room in which it originates~~

~~382.15 Exposed.~~

~~(A) Nonmetallic Extensions. One or more extensions shall be permitted to be run in any direction from an existing outlet, but not on the floor or within 50 mm (2 in.) from the floor.~~

~~(B) Concealable Nonmetallic Extensions. Where identified for the use, nonmetallic extensions may be concealed with paint, texture, concealing compound, plaster, wallpaper, tile, wall paneling, or other similar materials and installed per 382.15(A).~~

~~382.26 Bends.~~

~~(A) Nonmetallic Extensions. A bend that reduces the normal spacing between the conductors shall be covered with a cap to protect the assembly from physical damage.~~

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~~(B) Concealable Nonmetallic Extensions. Concealable extensions shall be permitted to be folded back over themselves and flattened as required for installation.~~

~~382.30 Securing and Supporting.~~

~~(A) Nonmetallic Extensions. Nonmetallic surface extensions shall be secured in place by approved means at intervals not exceeding 200 mm (8 in.), with an allowance for 300 mm (12 in.) to the first fastening where the connection to the supplying outlet is by means of an attachment plug. There shall be at least one fastening between each two adjacent outlets supplied. An extension shall be attached to only woodwork or plaster finish and shall not be in contact with any metal work or other conductive material other than with metal plates on receptacles.~~

~~(B) Concealable Nonmetallic Extensions. All surface-mounted concealable nonmetallic extension components shall be firmly anchored to the wall or ceiling using an adhesive or mechanical anchoring system identified for this use.~~

~~382.40 Boxes and Fittings. Each run shall terminate in a fitting, connector, or box that covers the end of the assembly. All fittings, connectors, and devices shall be of a type identified for the use.~~

~~382.42 Devices.~~

~~(A) Receptacles. All receptacles, receptacle housings, and self-contained devices used with concealable nonmetallic extensions shall be identified for this use.~~

~~(B) Receptacles and Housings. Receptacle housings and self-contained devices designed either for surface or for recessed mounting shall be permitted for use with concealable nonmetallic extensions. Receptacle housings and self-contained devices shall incorporate means for facilitating entry and termination of concealable nonmetallic extensions and for electrically~~

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~~connecting the housing or device. Receptacle and self-contained devices shall comply with 406.3. Power and communications outlets installed together in common housing shall be permitted in accordance with 800.133(A)(1)(c), Exception No. 2.~~

~~382.56 Splices and Taps. Extensions shall consist of a continuous unbroken length of the assembly, without splices, and without exposed conductors between fittings, connectors, or devices. Taps shall be permitted where approved fittings completely covering the tap connections are used. Aerial cable and its tap connectors shall be provided with an approved means for polarization. Receptacle-type tap connectors shall be of the locking type.~~

~~III. Construction Specifications (Concealable Nonmetallic Extensions only)~~

~~382.100 Construction. Concealable nonmetallic extensions shall be a multilayer flat conductor design consisting of a center ungrounded conductor enclosed by a sectioned grounded conductor, and an overall sectioned grounding conductor.~~

~~382.104 Flat Conductors. Concealable nonmetallic extensions shall be constructed, using flat copper conductors equivalent to 14 AWG or 12 AWG conductor sizes, and constructed per 382.104(A), (B), and (C).~~

~~(A) Ungrounded Conductor (Center Layer). The ungrounded conductor shall consist of one or more ungrounded flat conductor(s) enclosed per 382.104(B) and (C) and identified in accordance with 310.12(C).~~

~~(B) Grounded Conductor (Inner Sectioned Layers). The grounded conductor shall consist of two sectioned inner flat conductors that enclose the center ungrounded conductor(s). The sectioned~~

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~~grounded conductor shall be enclosed by the sectioned grounding conductor and identified in accordance with 200.6.~~

~~(C) Grounding Conductor (Outer Sectioned Layers). The grounding conductor shall consist of two overall sectioned conductors that enclose the grounded conductor and ungrounded conductor(s) and shall comply with 250.4(A)(5). The grounding conductor layers shall be identified by any one of the following methods:~~

~~(1) As permitted in 250.119~~

~~(2) A clear covering~~

~~(3) One or more continuous green stripes or hash marks~~

~~(4) The term "Equipment Ground" printed at regular intervals throughout the cable~~

~~382.112 Insulation. The ungrounded and grounded flat conductor layers shall be individually insulated and comply with 310.10. The grounding conductor shall be covered or insulated.~~

~~382.120 Marking.~~

~~(A) Cable. Concealable nonmetallic extensions shall be clearly and durably marked on both sides at intervals of not more than 610 mm (24 in.) with the information required by 310.11(A) and with the following additional information:~~

~~(1) Material of conductors~~

~~(2) Maximum temperature rating~~

~~(3) Ampacity~~

~~(B) Conductor Identification. Conductors shall be clearly and durably identified on both sides throughout their length as specified in 382.104.~~))

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Section 22. The following sections of Article 404 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 404

Switches

***

404.3 Enclosure.

(A) General. Switches and circuit breakers shall be of the externally operable type mounted in an enclosure listed for the intended use. The minimum wire-bending space at terminals and minimum gutter space provided in switch enclosures shall be as required in 312.6.

((~~*Exception No. 1: Pendant- and surface-type snap switches and knife switches mounted on an open-face switchboard or panelboard shall be permitted without enclosures.*~~

~~*Exception No. 2: Switches and circuit breakers installed in accordance with 110.27(A)(1), (A)(2), (A)(3), or (A)(4) shall be permitted without enclosures.*~~))

(B) Used as a Raceway. Enclosures shall not be used as junction boxes, auxiliary gutters, or raceways for conductors feeding through or tapping off to other switches or overcurrent devices, unless the enclosure complies with 312.8.

***

404.10 Mounting of Snap Switches.

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

(B) Box Mounted. Flush-type snap switches mounted in boxes that are set back of the finished surface as permitted in 314.20 shall be installed so that the extension plaster ears are seated against the surface. Flush-type snap switches mounted in boxes that are flush with the finished surface or project from it shall be installed so that the mounting yoke or strap of the switch is seated against the box.

***

404.13 Knife Switches.

(A) Isolating Switches. Knife switches rated at over 1200 amperes at 250 volts or less, and at over 600 amperes at 251 to 600 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 600 volts, nominal, a circuit breaker or a switch of special design 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.

FPN: See the definition of *General-Use Switch* in Article 100.

(D) Motor-Circuit Switches. Motor-circuit switches shall be permitted to be of the knife-switch type.

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FPN: See the definition of a *Motor-Circuit Switch* in Article 100.

(E) Interlocking. All switches shall be of the interlocking type to prevent the door from being opened when the circuit is energized. All switches used as service disconnecting means and those rated over 300 volts shall be of the two-way interlocking type.

For the purpose of this provision, "interlocking" means that the door is prevented from being opened when the switch is ON and prevents the switch from being turned ON when the door is open.

***

Section 23. The following sections of Article 410 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 410

Luminaires, Lampholders, and Lamps

***

IV. Luminaire Supports

410.30 Supports.

(A) General. Luminaires and lampholders shall be securely supported. A luminaire that weighs more than 3 kg (6 lb) or exceeds 400 mm (16 in.) in any dimension shall not be supported by the screw shell of a lampholder.

(B) Metal or Nonmetallic Poles Supporting Luminaires. Metal or nonmetallic poles shall be permitted to be used to support luminaires and as a raceway to enclose supply conductors, provided the following conditions are met:

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(1) A pole shall have a handhole not less than 50 mm × 100 mm (2 in. × 4 in.) with a cover suitable for use in wet locations to provide access to the supply terminations within the pole or pole base.

Exception No. 1: No handhole shall be required in a pole 2.5 m (8 ft) or less in height abovegrade where the supply wiring method continues without splice or pull point, and where the interior of the pole and any splices are accessible by removing the luminaire.

Exception No. 2: No handhole shall be required in a pole 6.0 m (20 ft) or less in height abovegrade that is provided with a hinged base.

(2) Where raceway risers or cable is not installed within the pole, a threaded fitting or nipple shall be brazed, welded, or attached to the pole opposite the handhole for the supply connection.

(3) A metal pole shall be provided with an equipment grounding terminal as follows:

a. A pole with a handhole shall have the equipment grounding terminal accessible from the handhole.

b. A pole with a hinged base shall have the equipment grounding terminal accessible within the base.

Exception to (3): No grounding terminal shall be required in a pole 2.5 m (8 ft) or less in height abovegrade where the supply wiring method continues without splice or pull, and where the interior of the pole and any splices are accessible by removing the luminaire.

(4) A metal pole with a hinged base shall have the hinged base and pole bonded together.

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(5) Metal raceways or other equipment grounding conductors shall be bonded to the metal pole with an equipment grounding conductor recognized by 250.118 and sized in accordance with 250.122.

(6) Conductors in vertical poles used as raceway shall be supported as provided in 300.19.

FPN: WAC 296-46B-410.030(2), which involves flexible cord connection requirements; this WAC requirement, is by this reference made part of the 2008 *Seattle Electrical Code.*

***

Section 24. The following sections of Article 450 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 450

Transformers and Transformer Vaults

(Including Secondary Ties)

***

450.9 Ventilation. The ventilation shall be adequate to dispose of the transformer full-load losses without creating a temperature rise that is in excess of the transformer rating.

FPN No. 1: See ANSI/IEEE C57.12.00-1993, *General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers*, and ANSI/IEEE C57.12.01-1989, *General Requirements for Dry-Type Distribution and Power Transformers*.

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

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Supplying Nonsinusoidal Load Currents, where transformers are utilized with nonlinear loads.

FPN No. 3: See Section 422 of the *Seattle Building Code* for vault ventilation system requirements.

Transformers with ventilating openings shall be installed so that the ventilating openings are not blocked by walls or other obstructions. The required clearances shall be clearly marked on the transformer.

***

450.19 Locations and Construction.

(A) Location of Pad-Mounted Transformers. See Figures 450-1 and 450-2 in Section 450.27 of this *Code*.

(B) Total Underground Transformers. Openings in enclosures for total underground transformers shall not be located less than 3.0 m (10 ft) from a doorway, operable window, stairway or fire escape.

(C) Transformer Vault Construction. See Section 422 of the *Seattle Building Code* for construction requirements for public and private transformer vaults.

II. Specific Provisions Applicable to Different Types of Transformers

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*.

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450.26 Oil-Insulated Transformers Installed Indoors. Oil-insulated transformers installed indoors shall be installed in a vault constructed as specified in Section 422 of the *Seattle Building Code*. ((~~Part III of this article.~~))

Exception No. 1: Where the total capacity does not exceed 112½ kVA, the vault specified in Section 422 of the Seattle Building Code ((~~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 600, 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 600 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.

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Exception No. 5: Transformers shall be permitted to be installed in a detached building that does not comply with Section 422 of the Seattle Building Code ((~~Part III of this article~~)) 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:

(a) Provision is made for containment of ((~~draining~~)) leaking fluid ((~~to the ground.~~)).

(b) Safe egress is provided for personnel.

(c) A minimum 6-mm (¼-in.) steel barrier is provided for personnel protection.

450.27 Oil-Insulated Transformers Installed Outdoors. ((~~Combustible material, combustible buildings, and parts of buildings, fire escapes, and door and window openings shall be safeguarded from fires originating in oil-insulated transformers installed on roofs, attached to or adjacent to a building or combustible material.~~

~~In cases where the transformer installation presents a fire hazard, one or more of the following safeguards shall be applied according to the degree of hazard involved:~~

~~(1) Space separations~~

~~(2) Fire-resistant barriers~~

~~(3) Automatic fire suppression systems~~

~~(4) Enclosures that confine the oil of a ruptured transformer tank~~

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~~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.~~

~~FPN: For additional information on transformers installed on poles or structures or under ground, see ANSI C2-2007, *National Electrical Safety Code*.~~))

(A) Requirements. Oil-Insulated transformers installed outdoors shall meet the following requirements:

(1) A transformer installed adjacent to a building or structure having a combustible surface shall be located no closer than 2.4 m (8 ft) to the building or structure and shall be outside a line extended vertically from the ends of the eaves or rooflines as illustrated in the shaded "Approved Transformer Area" shown in Figure 450-1;

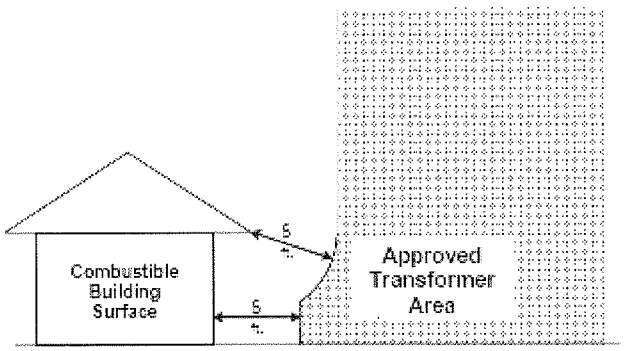

Figure 450-1

(2) A transformer installed adjacent to a building or structure with no combustible surface shall be located no closer than 610 mm (2 ft) to the building or structure and shall be outside a line

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extended vertically from the ends of the eaves or rooflines as illustrated in the shaded "Approved Transformer Area" shown in Figure 450-2.

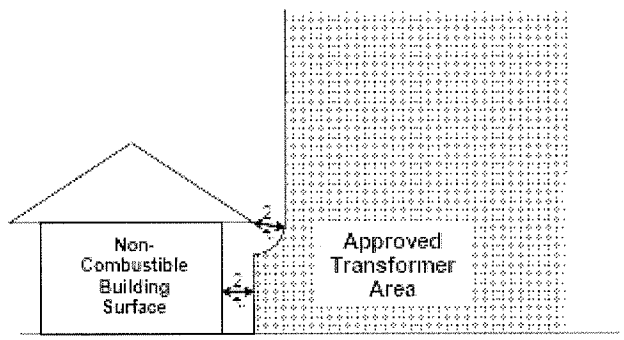

Figure 450-2

(3) A building or structure shall have no doorway, unprotected window, stairway or other openings closer than 3.0 m (10 ft) to the transformer;

(4) The finished grade at the location of the transformer shall have a containment sill such that any oil leaking from a transformer will be contained. The containment sill shall be as high as necessary to contain the oil of one transformer but in no case less than 100 mm (4 in.) high.

(5) If transformers are installed in areas subject to traffic other than pedestrian traffic, they shall be provided with adequate guarding.

(B) Locations. Openings in enclosures for total underground oil-filled transformers shall be located no closer than 3.0 m (10 ft) of a doorway, operable window, stairway or fire escape. Adequate space must be maintained above the enclosure so that a boom may be used to lift the transformer from the enclosure.

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III. Transformer Vaults

Sections 450.41 through 450.48 are not adopted. See Section 422 of the *Seattle Building Code* for transformer vault requirements.

((~~450.41 Location. Vaults shall be located where they can be ventilated to the outside air without using flues or ducts wherever such an arrangement is practicable.~~

~~450.42 Walls, Roofs, and Floors. The walls and roofs of vaults shall be constructed of materials that have adequate structural strength for the conditions with a minimum fire resistance of 3 hours. The floors of vaults in contact with the earth shall be of concrete that is not less than 100 mm (4 in.) thick, but where the vault is constructed with a vacant space or other stories below it, the floor shall have adequate structural strength for the load imposed thereon and a minimum fire resistance of 3 hours. For the purposes of this section, studs and wallboard construction shall not be acceptable.~~

~~*Exception: Where transformers are protected with automatic sprinkler, water spray, carbon dioxide, or halon, construction of 1-hour rating shall be permitted.*~~

~~FPN No. 1: For additional information, see ANSI/ASTM E119-1995, *Method for Fire Tests of Building Construction and Materials*, and NFPA 251-2006, *Standard Methods of Tests of Fire Resistance of Building Construction and Materials.*~~

~~FPN No. 2: A typical 3-hour construction is 150 mm (6 in.) thick reinforced concrete.~~

~~450.43 Doorways. Vault doorways shall be protected in accordance with 450.43(A), (B), and (C).~~

~~(A) Type of Door. Each doorway leading into a vault from the building interior shall be provided with a tight-fitting door that has a minimum fire rating of 3 hours. The authority having~~

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~~jurisdiction shall be permitted to require such a door for an exterior wall opening where conditions warrant.~~

~~*Exception: Where transformers are protected with automatic sprinkler, water spray, carbon dioxide, or halon, construction of 1-hour rating shall be permitted.*~~

~~FPN: For additional information, see NFPA 80-2007, *Standard for Fire Doors and Other Opening Protectives.*~~

~~(B) Sills. A door sill or curb that is of sufficient height to confine the oil from the largest transformer within the vault shall be provided, and in no case shall the height be less than 100 mm (4 in.).~~

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

~~450.45 Ventilation Openings. Where required by 450.9, openings for ventilation shall be provided in accordance with 450.45(A) through (F).~~

~~(A) Location. Ventilation openings shall be located as far as possible from doors, windows, fire escapes, and combustible material.~~

~~(B) Arrangement. A vault ventilated by natural circulation of air shall be permitted to have roughly half of the total area of openings required for ventilation in one or more openings near the floor and the remainder in one or more openings in the roof or in the sidewalls near the roof, or all of the area required for ventilation shall be permitted in one or more openings in or near the roof.~~

~~(C) Size. For a vault ventilated by natural circulation of air to an outdoor area, the combined net area of all ventilating openings, after deducting the area occupied by screens, gratings, or louvers, shall not be less than 1900 mm^2 (3 in.^{2}) per kVA of transformer capacity in service, and in no case shall the net area be less than 0.1 m^2 (1 ft^2) for any capacity under 50 kVA.~~

~~(D) Covering. Ventilation openings shall be covered with durable gratings, screens, or louvers, according to the treatment required in order to avoid unsafe conditions.~~

~~(E) Dampers. All ventilation openings to the indoors shall be provided with automatic closing fire dampers that operate in response to a vault fire. Such dampers shall possess a standard fire rating of not less than 1½ hours.~~

~~FPN: See ANSI/UL 555-1995, *Standard for Fire Dampers*.~~

~~(F) Ducts. Ventilating ducts shall be constructed of fire-resistant material.~~

~~450.46 Drainage. Where practicable, vaults containing more than 100 kVA transformer capacity shall be provided with a drain or other means that will carry off any accumulation of oil or water in the vault unless local conditions make this impracticable. The floor shall be pitched to the drain where provided.~~

~~450.47 Water Pipes and Accessories. Any pipe or duct system foreign to the electrical installation shall not enter or pass through a transformer vault. Piping or other facilities provided for vault fire protection, or for transformer cooling, shall not be considered foreign to the electrical installation.~~

~~450.48 Storage in Vaults. Materials shall not be stored in transformer vaults.~~))

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Section 25. The following sections of Article 553 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 553

Floating Buildings

***

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

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

***

Section 26. The following sections of Article 555 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 555

Marinas and Boatyards

***

555.24 Luminaires Required. All walkways over water shall be illuminated to provide safe access. All luminaires shall be listed for the use.

***

Section 27. The following sections of Article 600 of the National Electrical Code, 2008 Edition, are amended as follows:

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ARTICLE 600

Electric Signs and Outline Lighting

I. General

600.1 Scope. This article covers the installation of conductors and equipment for electric signs and outline lighting. All installations and equipment using neon tubing, such as signs, decorative elements, skeleton tubing, or art forms, are covered by this article.

FPN: WAC 296-46B-600.001, which addresses electric signs and outline lighting requirements is by this reference made part of the 2008 *Seattle Electrical Code.*

***

600.9 Location.

(A) Vehicles. Sign or outline lighting system equipment shall be at least 4.3 m (14 ft) above areas accessible to vehicles unless protected from physical damage.

(B) Pedestrians. Neon tubing, other than dry-location portable signs, readily accessible to pedestrians shall be protected from physical damage.

FPN: See 600.41(D) for additional requirements.

(C) Adjacent to Combustible Materials. Signs and outline lighting systems shall be installed so that adjacent combustible materials are not subjected to temperatures in excess of 90°C (194°F).

The spacing between wood or other combustible materials and an incandescent or HID lamp or lampholder shall not be less than 50 mm (2 in.).

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(D) Wet Location. Signs and outline lighting system equipment for wet location use, other than listed watertight type, shall be weatherproof and have drain holes, as necessary, in accordance with the following:

(1) Drain holes shall not be larger than 13 mm (½ in.) or smaller than 6 mm (¼ in.).

(2) Every low point or isolated section of the equipment shall have at least one drain hole.

(3) Drain holes shall be positioned such that there will be no external obstructions.

(E) Clearance From High Voltage Power Lines. Signs and outline lighting shall have clearances from energized power lines in accordance with the following:

(1) Proximity to Power Lines 750 Volts or Less. Signs and outline lighting shall be located no closer than 914 mm (3 ft) horizontally or 2.4 m (8 ft) vertically to overhead electrical conductors energized at 750 volts or less.

(2) Proximity to Power Lines over 750 Volts. Signs and outline lighting shall be located no closer than 3.0 m (10 ft) in any direction from overhead conductors energized at more than 750 volts.

FPN: In this section the term "overhead conductors" means any electrical conductor, either bare or insulated, installed above the ground except those conductors enclosed in iron pipe or other material covering of equal strength.

FPN: Also see Chapter 31 of the *Seattle Building Code* for regulation of signs.

***

Section 28. The following sections of Article 620 of the National Electrical Code, 2008 Edition, are amended as follows:

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ARTICLE 620

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

I. General

620.1 Scope. This article covers the installation of electrical equipment and wiring used in connection with elevators, dumbwaiters, escalators, moving walks, platform lifts, and stairway chairlifts.

FPN No. 1: For further information, see ASME A17.1-2004, *Safety Code for Elevators and Escalators.*

FPN No. 2: For further information, see CSA B44.1-04/ASME-A17.5-2004, *Elevator and Escalator Electrical Equipment Certification Standard.*

FPN No. 3: The term *wheelchair lift* has been changed to platform lift. For further information, see ASME A18.1–2003, *Safety Standard for Platform Lifts and Stairway Lifts.*

FPN No. 4: See Chapter 7 of the *Seattle Building Code* for requirements to pressurize elevator hoistways and elevator lobbies.

FPN: No. 5: See Chapter 10 of the *Seattle Building Code* for requirements for elevators serving as an accessible means of egress component (in buildings that have a required accessible floor that is four or more stories above or below the level of exit discharge) and for pressurization of elevator lobbies used as an area of refuge.

FPN No. 6: See Chapter 30 of the *Seattle Building Code* for requirement that stretcher-sized elevator cars be supplied with power from a legally required standby or emergency system.

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620.5 Working Clearances. Working space shall be provided about controllers, disconnecting means, and other electrical equipment. The minimum working space shall be not less than that specified in ((~~110.26(A)~~)) Seattle Building Code Chapter 30.

The clear working space in front of a disconnecting means shall be not less than 1220 mm (48 in.) in depth and 760 mm (30 in.) in width.

Elevator machine rooms are required to have not less than 2130 mm (84 in.)((~~7 feet 0 inches~~)) of headroom, per ASME A17.1, Rule 2.7.4.1.

((~~Where conditions of maintenance and supervision ensure that only qualified persons examine, adjust, service, and maintain the equipment, the clearance requirements of 110.26(A) shall be waived as permitted in 620.5(A) through (D).~~

~~(A) Flexible Connections to Equipment. Electrical equipment in (A)(1) through (A)(4) shall be permitted to be provided with flexible leads to all external connections so that it can be repositioned to meet the clear working space requirements of 110.26(A):~~

~~(1) Controllers and disconnecting means for dumbwaiters, escalators, moving walks, platform lifts, and stairway chairlifts installed in the same space with the driving machine~~

~~(2) Controllers and disconnecting means for elevators installed in the hoistway or on the car~~

~~(3) Controllers for door operators~~

~~(4) Other electrical equipment installed in the hoistway or on the car~~

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~~(B) Guards. Live parts of the electrical equipment are suitably guarded, isolated, or insulated, and the equipment can be examined, adjusted, serviced, or maintained while energized without removal of this protection.~~

~~FPN: See definition of *Exposed* in Article 100.~~

~~(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.~~))

***

III. Wiring

620.21 Wiring Methods. Conductors and optical fibers located in hoistways, in escalator and moving walk wellways, in platform lifts, stairway chairlift runways, machinery spaces, control spaces, in or on cars, in machine rooms and control rooms, not including the traveling cables connecting the car or counterweight and hoistway wiring, shall be installed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, rigid nonmetallic conduit, or wireways, ((~~or shall be Type MC, MI, or AC cable~~)) unless otherwise ((~~permitted~~))<u>specified</u> in 620.21(A) through (C).

<u>Type MC cable or Type MI cable may be permitted to be installed in elevator spaces only by special permission of the authority having jurisdiction.</u>

(A) Elevators.

(1) Hoistways.

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(a) Flexible metal conduit((~~,~~)) or liquidtight flexible metal conduit((~~, or liquidtight flexible nonmetallic 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.

(b) ((~~Cables used in Class 2 power-limited circuits shall be permitted to be installed between risers and signal equipment and operating devices, provided the cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.~~)) Feeders shall be permitted inside the hoistway for elevators with driving machine motors located in the hoistway or on the car or counterweight.

(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 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.

(d) The following wiring methods shall be permitted in the hoistway in lengths not to exceed 1.8 m (6 ft):

(1) Flexible metal conduit

(2) Liquidtight flexible metal conduit

((~~(3) Liquidtight flexible nonmetallic conduit~~)) Reserved

~~(4) Flexible cords and cables, or conductors grouped together and taped or corded, shall be permitted to be installed without a raceway. They shall be located to be protected from physical damage and shall be of a flame-retardant type and shall be part of the following:~~

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~~a. Listed equipment~~

~~b. A driving machine, or~~

~~c. A driving machine brake~~)) Reserved

(e) 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.

(f) Nonmetallic raceways and wireways shall not be installed in hoistways required to be of noncombustible fire-resistive construction.

(2) Cars.

(a) Flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit of metric designator 12 (trade size ⅜), or larger, not exceeding ((~~1.8 m (6 ft)~~))915 mm (3 ft) in length, shall be permitted on cars where so located as to be free from oil and if securely fastened in place. Flexible conduit shall not be located where it can be walked on or damaged.

((~~*Exception: Liquidtight flexible nonmetallic conduit of metric designator 12 (trade size ⅜), or larger, as defined by 356.2(2), shall be permitted in lengths in excess of 1.8 m (6 ft)).*~~))

(b) Hard-service cords and junior hard-service cords that conform to the requirements of Article 400 (Table 400.4) shall be permitted as flexible connections between the fixed wiring on the car and devices on the car doors or gates. Hard-service cords only shall be permitted as flexible connections for the portable-type top-of-car operating device or the car-top work lights. Devices or luminaires shall be grounded by means of an equipment grounding conductor run

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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 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.~~))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)~~)) 915 mm (3 ft):

(1) Flexible metal conduit

(2) Liquidtight flexible metal conduit

(3) Liquidtight flexible nonmetallic conduit

(4) Flexible cords and cables, or conductors grouped together and taped or corded, shall be permitted to be installed without a raceway. They shall be located to be protected from physical damage and shall be of a flame-retardant type and shall be part of the following:

a. Listed equipment

b. A driving machine, or

c. A driving machine brake

(3) Within Machine Rooms, Control Rooms, and Machinery Spaces and Control Spaces.

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(a) Flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit of metric designator 12 (trade size ⅜), or larger, not exceeding 1.8 m (6 ft) in length, shall be permitted between control panels and machine motors, machine brakes, motor-generator sets, disconnecting means, and pumping unit motors and valves.

((~~*Exception: Liquidtight flexible nonmetallic conduit metric designator 12 (trade size ⅜) or larger, as defined in 356.2(2), shall be permitted to be installed in lengths in excess of 1.8 m (6 ft).*~~.))

(b) Where motor-generators, machine motors, or pumping unit motors and valves are located adjacent to or underneath control equipment and are provided with extra-length terminal leads not exceeding 1.8 m (6 ft) in length, such leads shall be permitted to be extended to connect directly to controller terminal studs without regard to the carrying-capacity requirements of Articles 430 and 445. Auxiliary gutters shall be permitted in machine and control rooms between controllers, starters, and similar apparatus.

(c) Flexible cords and cables that are components of listed equipment and used in circuits operating at 30 volts rms or less or 42 volts dc or less shall be permitted 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.

(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.

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(e) Flexible cords and cables in lengths not to exceed 1.8 m (6 ft) that are of a flame-retardant type and located to be protected from physical damage shall be permitted in these rooms and spaces without being installed in a raceway. They shall be part of the following:

(1) Listed equipment

(2) A driving machine, or

(3) A driving machine brake

(4) Counterweight. The following wiring methods shall be permitted on the counterweight assembly in lengths not to exceed ((~~1.8 m (6 ft)~~))915 mm (3 ft):

(1) Flexible metal conduit

(2) Liquidtight flexible metal conduit

(3) Liquidtight flexible nonmetallic conduit

(4) Flexible cords and cables, or conductors grouped together and taped or corded, shall be permitted to be installed without a raceway. They shall be located to be protected from physical damage, shall be of a flame-retardant type, and shall be part of the following:

a. Listed equipment

b. A driving machine, or

c. A driving machine brake

(B) Escalators.

(1) Wiring Methods. Flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit shall be permitted in escalator and moving walk wellways. Flexible

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metal conduit or liquidtight flexible conduit of metric designator 12 (trade size ⅜) shall be permitted in lengths not in excess of 1.8 m (6 ft).

Exception: Metric designator 12 (trade size ⅜), nominal, or larger liquidtight flexible nonmetallic conduit, as defined in 356.2(2), shall be permitted to be installed in lengths in excess of 1.8 m (6 ft).

(2) ((~~Class 2 Circuit Cables. Cables used in Class 2 power-limited circuits shall be permitted to be installed within escalators and moving walkways, provided the cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.~~)) Reserved.

(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 ⅜) shall be permitted in lengths not in excess of 1.8 m (6 ft).

Exception: Metric designator 12 (trade size ⅜) or larger liquidtight flexible nonmetallic conduit, as defined in 356.2(2), shall be permitted to be installed in lengths in excess of 1.8 m (6 ft).

(2) Class 2 Circuit Cables. ((~~Cables~~))Traveling cables used in Class 2 power-limited circuits shall be permitted to be installed within platform lifts and stairway chairlift runways and

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machinery spaces, provided the cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.

(3) Flexible Cords and Cables. Flexible cords and cables that are components of listed equipment and used in circuits operating at 30 volts rms or less or 42 volts dc or less shall be permitted in lengths not to exceed 1.8 m (6 ft), provided the cords and cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.

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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:

(a) 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.

(b) 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.

VI. Disconnecting Means and Control

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620.51 Disconnecting Means. A single means for disconnecting all ungrounded main power supply conductors for each unit shall be provided and be designed so that no pole can be operated independently. Where multiple driving machines are connected to a single elevator, escalator, moving walk, or pumping unit, there shall be one disconnecting means to disconnect the motor(s) and control valve operating magnets.

The disconnecting means for the main power supply conductors shall not disconnect the branch circuit required in 620.22, 620.23, and 620.24.

(A) Type. The disconnecting means shall be an enclosed externally operable fused motor circuit switch or circuit breaker capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted as the means required to be installed at and remain with the equipment.

The disconnecting means shall be a listed device.

FPN: For additional information, see ASME A17.1-2004, *Safety Code for Elevators and Escalators.*

Exception No. 1: Where an individual branch circuit supplies a platform lift, the disconnecting means required by 620.51(C)(4) shall be permitted to comply with 430.109(C). This disconnecting means shall be listed and shall be capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or

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without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted as the means required to be installed at and remain with the equipment.

Exception No. 2: Where an individual branch circuit supplies a stairway chairlift, 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.

FPN: To reduce hazards associated with water on live elevator electrical equipment.

(C) Location. The disconnecting means shall be located where it is readily accessible to qualified persons.

(1) On Elevators Without Generator Field Control. On elevators without generator field control, the disconnecting means shall be located within sight of the motor controller. Where the motor controller is located in the elevator hoistway, the disconnecting means required by 620.51(A) shall be located in a machinery space, machine room, control space or control room outside the hoistway; and an additional, non-fused enclosed externally operable motor circuit switch capable of being locked in the open position to disconnect all ungrounded main power-

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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).

The provision for locking or adding a lock to the disconnecting means, required by this section, shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted.

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 capable of being locked in the open position.

(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.

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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 capable of being locked in the open position.

(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. Where there is more than one driving machine in a machine room, the disconnecting means shall be numbered to correspond to the identifying number of the driving machine that they control.

The disconnecting means shall be provided with a sign to identify the location of the supply side overcurrent protective device.

(E) Automatic Power Disconnect Device Control Circuit. The control circuit for a required automatic power disconnect device or shunt trip shall be derived either from:

(1) Within the disconnecting means enclosure when the shunt trip circuit equipment is a part of the listed assembly and the control-circuit controls only the disconnect(s) within the listed equipment; or

(2) A dedicated circuit from an appropriate panelboard located in the machine room.

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620.62 Selective Coordination. Where more than one driving machine disconnecting means is supplied by a single feeder, the overcurrent protective devices in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective devices.

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.

VIII. Machine Rooms, Control Rooms, Machinery Spaces, and Control Spaces

620.71 ((~~Guarding~~))Securing Equipment. Elevator, dumbwaiter, escalator, and moving walk driving machines; motor-generator sets; motor controllers; and disconnecting means shall be installed in a room or space set aside for that purpose unless otherwise permitted in 620.71(A) or (B). The room or space shall be secured against unauthorized access.

Exception: Elevator motor controllers may be installed, with permission of the authority having jurisdiction, in a hoistway.

FPN: Non-elevator equipment, wiring, pipes, and other materials are prohibited in elevator hoistways, pits, machine rooms and spaces. Only such equipment and wiring that pertain to the elevator and its operation are permitted in these elevator spaces. See Chapter 30 of the *Seattle Building Code.*

(A) Motor Controllers. Motor controllers shall be permitted outside the spaces herein specified, provided they are in enclosures with doors or removable panels that are capable of being locked in the closed position and the disconnecting means is located adjacent to or is an integral part of

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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.

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X. Emergency and Standby Power Systems

620.91 Emergency and Standby Power Systems. ((~~An e~~))Elevator power system requirements are determined by the *Seattle Building Code.*~~(s) shall be permitted to be powered by an emergency or standby power system.~~

FPN No. 1: See ASME A17.1-2004, *Safety Code for Elevators and Escalators*, and CSA B44-04, *Elevator and Escalator Electrical Equipment Certification Standard 2.27.2*, for additional information.

FPN No. 2: See Chapter 7 of the *Seattle Building Code* for requirements to pressurize elevator hoistways and elevator lobbies.

FPN: No. 3: See Chapter 10 of the *Seattle Building Code* for requirements for elevators serving as an accessible means of egress component (in buildings that have a required accessible floor that is four or more stories above or below the level of exit discharge) and for pressurization of elevator lobbies used as an area of refuge.

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FPN No. 4: See Chapter 30 of the *Seattle Building Code* for requirement that stretcher-sized elevator cars be supplied with power from a legally required standby or emergency system.

(A) Regenerative Power. For elevator systems that regenerate power back into the power source that is unable to absorb the regenerative power under overhauling elevator load conditions, a means shall be provided to absorb this power.

(B) Other Building Loads. Other building loads, such as power and lighting, shall be permitted as the energy absorption means required in 620.91(A), provided that such loads are automatically connected to the emergency or standby power system operating the elevators and are large enough to absorb the elevator regenerative power.

(C) Disconnecting Means. The disconnecting means required by 620.51 shall disconnect the elevator from both the emergency or standby power system and the normal power system.

Where an additional power source is connected to the load side of the disconnecting means, 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.

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Section 29. The following sections of Article 625 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 625

Electric Vehicle Charging System

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V. Electric Vehicle Supply Equipment Locations

625.27 Requirements for Future Installation of Outlets. To facilitate future installation of electric vehicle outlets in residential occupancies, the following shall be provided:

(1) Space shall be reserved in the electrical service equipment for installation of an overcurrent protective device to serve electric vehicle charging system branch circuits.

(2) A location shall be designated, together with the required working clearances, for the electric vehicle charging system panelboard.

FPN No. 1: See also 220.57, Electrical Vehicle Outlets, for calculating demand loads.

FPN No. 2: Consideration of the location of the future electric vehicle outlets is recommended when designating a location for the electric vehicle outlet panelboard.

FPN No 3: Residential Occupancies are defined in Chapter 3 of the *Seattle Building Code.*

***

Section 30. The following sections of Article 680 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 680

Swimming Pools, Fountains, and Similar Installations

I. General

680.1 Scope. The provisions of this article apply to the construction and installation of electrical wiring for, and equipment in or adjacent to, all swimming, wading, therapeutic, and decorative pools; fountains; hot tubs; spas; and hydromassage bathtubs, whether permanently installed or

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storable, and to metallic auxiliary equipment, such as pumps, filters, and similar equipment. The term *body of water* used throughout Part I applies to all bodies of water covered in this scope unless otherwise amended.

FPN: WAC 296-46B-680.001, which addresses requirements for listing or field tests of equipment, is by this reference made part of the 2008 *Seattle Electrical Code*.

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680.25 Feeders. These provisions shall apply to any feeder on the supply side of panelboards supplying branch circuits for pool equipment covered in Part II of this article and on the load side of the service equipment or the source of a separately derived system.

(A) Wiring Methods.((~~Feeders shall be installed in rigid metal conduit, intermediate metal conduit, liquidtight flexible nonmetallic conduit, rigid polyvinyl chloride conduit, or reinforced thermosetting resin conduit. Electrical metallic tubing shall be permitted where installed on or within a building, and electrical nonmetallic tubing shall be permitted where installed within a building. Aluminum conduits shall not be permitted in the pool area where subject to corrosion.~~))A feeder between the service equipment and the remote panelboard is permitted to be housed in the following:

(1) flexible metal conduit

(2) an approved cable assembly that includes an equipment grounding conductor within its outer sheath and the grounding conductor complies with Section 250.24(A)(5) of this *Code*.

(3) rigid metal conduit

(4) intermediate metal conduit

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(5) liquidtight flexible nonmetallic conduit

(6) rigid polyvinyl chloride conduit

(7) reinforced thermosetting resin conduit

(8) electrical metallic tubing when installed on or within a building or crawl space

(9) electrical nonmetallic tubing when installed within a building or crawl space

Aluminum conduit is not permitted.

~~*Exception: An existing feeder between an existing remote panelboard and service equipment shall be permitted to run in flexible metal conduit or an approved cable assembly that includes an equipment grounding conductor within its outer sheath. The equipment grounding conductor shall comply with 250.24(A)(5).*~~

(B) Grounding. An equipment grounding conductor shall be installed with the feeder conductors between the grounding terminal of the pool equipment panelboard and the grounding terminal of the applicable service equipment or source of a separately derived system. For other than ((~~(1) existing feeders covered in 680.25(A), Exception, or (2)~~)) feeders to separate buildings that do not utilize an insulated equipment grounding conductor in accordance with 680.25(B)(2), this equipment grounding conductor shall be insulated.

(1) Size. This conductor shall be sized in accordance with 250.122 but not smaller than 12 AWG. On separately derived systems, this conductor shall be sized in accordance with Table 250.66 but not smaller than 8 AWG.

(2) Separate Buildings. A feeder to a separate building or structure shall be permitted to supply swimming pool equipment branch circuits, or feeders supplying swimming pool equipment

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branch circuits, if the grounding arrangements in the separate building meet the requirements in 250.32(B). ((~~Where installed in other than existing feeders covered in 680.25(A), Exception, a~~)) A separate equipment grounding conductor shall be an insulated conductor.

***

IV. Spas and Hot Tubs

680.40 General. Electrical installations at spas and hot tubs shall comply with the provisions of Part I and Part IV of this article.

FPN: WAC 296-46B-680.001 which addresses requirements for listing or field tests of equipment regulated by this section is by this reference made part of the 2008 *Seattle Electrical Code.*

***

Section 31. The following sections of Article 700 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 700

Emergency Systems

I. General

700.1 Scope. The provisions of this article apply 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.

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Emergency systems are those systems legally required and classed as emergency by municipal, state, federal, or other codes, or by any governmental agency having jurisdiction. These systems are intended to automatically supply illumination, power, or both, to designated areas and equipment in the event of failure of the normal supply or in the event of accident to elements of a system intended to supply, distribute, and control power and illumination essential for safety to human life.

FPN No. 1: For further information regarding wiring and installation of emergency systems in health care facilities, see Article 517.

FPN No. 2: For further information regarding performance and maintenance of emergency systems in health care facilities, see NFPA 99-2005, *Standard for Health Care Facilities*.

FPN No. 3: 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.

FPN No. 4: For specification of locations where emergency lighting is considered essential to life safety, see NFPA *101*®-2006, *Life Safety Code*®.

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FPN No. 5: For further information regarding performance of emergency and standby power systems, see NFPA 110-2005, *Standard for Emergency and Standby Power Systems*.

FPN No. 6: See Chapter 10 of the *Seattle Building Code* for means of egress illumination and identification requirements.

FPN No. 7: See DPD Client Assistance Memo (CAM 339), *Emergency and Standby Power Systems*, for additional information.

***

700.4 Tests and Maintenance.

(A) Conduct or Witness Test. The authority having jurisdiction shall conduct or witness a test of the complete system upon installation and periodically afterward under the control of the Seattle Fire Department.

(B) Tested Periodically. Systems shall be tested periodically by the building owner or manager on a schedule acceptable to the authority having jurisdiction to ensure the systems are maintained in proper operating condition.

(C) Battery Systems Maintenance. Where battery systems or unit equipments are involved, including batteries used for starting, control, or ignition in auxiliary engines, the authority having jurisdiction shall require periodic maintenance by the building owner or manager.

(D) Written Record. A written record shall be kept of such tests and maintenance.

(E) Testing Under Load. Means for testing all emergency lighting and power systems during maximum anticipated load conditions shall be provided.

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FPN: For testing and maintenance procedures of emergency power supply systems (EPSSs), see NFPA 110-2005, *Standard for Emergency and Standby Power Systems*.

***

700.8 Signs.

(A) Emergency Sources. A sign shall be placed at the service-entrance equipment, indicating type and location of on-site emergency power sources.

Exception: A sign shall not be required for individual unit equipment as specified in 700.12(F).

FPN: WAC 296-46B-700.008(2) contains sight requirements; this WAC provision is by this reference made part of the 2008 *Seattle Electrical Code.*

(B) Grounding. Where the grounded circuit conductor connected to the emergency source is connected to a grounding electrode conductor at a location remote from the emergency source, there shall be a sign at the grounding location that identifies all emergency and normal sources connected at that location.

II. Circuit Wiring

700.9 Wiring, Emergency System.

FPN: WAC 296-46B-700.009(3) & (4) contains requirements for emergency and exit lights, and identification plates; these WAC subsections are by this reference made part of the 2008 *Seattle Electrical Code.*

(A) Identification. All boxes and enclosures (including transfer switches, generators, and power panels) for emergency circuits shall be permanently marked so they will be readily identified as a component of an emergency circuit or system.

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(B) Wiring. Wiring of two or more emergency circuits supplied from the same source shall be permitted in the same raceway, cable, box, or cabinet. Wiring from an emergency source or emergency source distribution overcurrent protection to emergency loads shall be kept entirely independent of all other wiring and equipment, unless otherwise permitted in (1) through (5):

(1) Wiring from the normal power source located in transfer equipment enclosures

(2) Wiring supplied from two sources in exit or emergency luminaires

(3) Wiring from two sources in a common junction box, attached to exit or emergency luminaires

(4) Wiring within a common junction box attached to unit equipment, containing only the branch circuit supplying the unit equipment and the emergency circuit supplied by the unit equipment

(5) Wiring from an emergency source to supply any combination of emergency, legally required, or optional loads in accordance with (a), (b), and (c):

a. From separate vertical switchboard sections, with or without a common bus, or from individual disconnects mounted in separate enclosures.

b. The common bus or separate sections of the switchboard or the individual enclosures shall be permitted to be supplied by single or multiple feeders without overcurrent protection at the source.

Exception to (5)(b): Overcurrent protection shall be permitted at the source or for the equipment, provided the overcurrent protection is selectively coordinated with the downstream overcurrent protection.

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c. Legally required and optional standby circuits shall not originate from the same vertical switchboard section, panelboard enclosure, or individual disconnect enclosure as emergency circuits.

(C) Wiring Design and Location. Emergency wiring circuits shall be designed and located so as to minimize the hazards that might cause failure due to flooding, fire, icing, vandalism, and other adverse conditions.

(D) Fire Protection. Emergency systems shall meet the additional requirements in 700.9(D)(1) and (D)(2) in assembly occupancies for not less than 1000 persons or in buildings above 23 m (75 ft) in height with any of the following occupancy classes: assembly, educational, residential, detention and correctional, business, and mercantile.

FPN: For the definition of *Occupancy Classification*, see ((~~Section 6.1 of NFPA 101-2006, *Life Safety Code*~~)) Chapter 3 of the *Seattle Building Code*.

(1) Feeder-Circuit Wiring. Feeder-circuit wiring shall meet one of the following conditions:

(1) Be installed in spaces or areas that are fully protected by an approved automatic fire suppression system

FPN: In buildings having *Seattle Building Code* Type I or II construction, wiring located above sprinkler heads, including wiring separated from sprinkler heads by a drop-ceiling system, is considered fully protected as required by this section.

(2) Be a listed electrical circuit protective system with a minimum 1-hour fire rating

FPN: UL guide information for electrical circuit protection systems (FHIT) contains information on proper installation requirements to maintain the fire rating.

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(3) Be protected by a listed thermal barrier system for electrical system components

(4) Be protected by a listed fire-rated assembly that has a minimum fire rating of 1-hour and contains only emergency wiring circuits.

(5) Be embedded in not less than 50 mm (2 in.) of concrete

(6) Be a cable listed to maintain circuit integrity for not less than 1 hour when installed in accordance with the listing requirements

(2) Feeder-Circuit Equipment. Equipment for feeder circuits (including transfer switches, transformers, and panelboards) shall be located either in spaces fully protected by approved automatic fire suppression systems (including sprinklers, carbon dioxide systems) or in spaces with a 1-hour fire resistance rating.

((~~FNP: For the definition of Occupancy Classification, see Section 6.1 of NFPA 101-2006, Life Safety Code.~~))

(3) Generator Control Wiring. Control conductors installed between the transfer equipment and the emergency generator shall be kept entirely independent of all other wiring and shall meet the conditions of 700.9(D)(1).

III. Sources of Power

700.12 General Requirements. Current supply shall be such that, in the event of failure of the normal supply to, or within, the building or group of buildings concerned, emergency lighting, emergency power, or both shall be available within the time required for the application but not to exceed 10 seconds. The supply system for emergency purposes, in addition to the normal services to the building and meeting the general requirements of this section, shall be one or

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

In selecting an emergency source of power, consideration shall be given to the occupancy and the type of service to be rendered, whether of minimum duration, as for evacuation of a theater, or longer duration, as for supplying emergency power and lighting due to an indefinite period of current failure from trouble either inside or outside the building.

Equipment shall be designed and located so as to minimize the hazards that might cause complete failure due to flooding, fires, icing, and vandalism.

Equipment for sources of power as described in 700.12(A) through (E) where located within assembly occupancies for greater than 1000 persons or in buildings above 23 m (75 ft) in height with any of the following occupancy classes — assembly, educational, residential, detention and correctional, business, and mercantile — shall be installed either in spaces fully protected by approved automatic fire suppression systems (sprinklers, carbon dioxide systems, and so forth) or in spaces with a 1-hour fire rating.

FPN No. 1: For the definition of *Occupancy Classification*, see ((~~Section 6.1 of NFPA 101-2006, Life Safety Code~~)) Chapter 3 of the *Seattle Building Code*.

FPN No. 2: Assignment of degree of reliability of the recognized emergency supply system depends on the careful evaluation of the variables at each particular installation.

(A) Storage Battery. Storage batteries used as a source of power for emergency systems shall be of suitable rating and capacity to supply and maintain the total load for a minimum period of 1½ hours, without the voltage applied to the load falling below 87½ percent of normal.

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Batteries, whether of the acid or alkali type, shall be designed and constructed to meet the requirements of emergency service and shall be compatible with the charger for that particular installation.

For a sealed battery, the container shall not be required to be transparent. However, for the lead acid battery that requires water additions, transparent or translucent jars shall be furnished. Automotive-type batteries shall not be used.

An automatic battery charging means shall be provided.

(B) Generator Set.

(1) Prime Mover-Driven. For a generator set driven by a prime mover acceptable to the authority having jurisdiction and sized in accordance with 700.5, means shall be provided for automatically starting the prime mover on failure of the normal service and for automatic transfer and operation of all required electrical circuits. A time-delay feature permitting a 15-minute setting shall be provided to avoid retransfer in case of short-time reestablishment of the normal source.

(2) Internal Combustion as Prime Movers. Where internal combustion engines are used as the prime mover, an on-site fuel supply shall be provided with an on-premise fuel supply sufficient for not less than 2 hours' full-demand operation of the system. Where power is needed for the operation of the fuel transfer pumps to deliver fuel to a generator set day tank, this pump shall be connected to the emergency power system.

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(3) Dual Supplies. Prime movers shall not be solely dependent on a public utility gas system for their fuel supply or municipal water supply for their cooling systems. Means shall be provided for automatically transferring from one fuel supply to another where dual fuel supplies are used. ((~~*Exception: Where acceptable to the authority having jurisdiction, the use of other than on-site fuels shall be permitted where there is a low probability of a simultaneous failure of both the off-site fuel delivery system and power from the outside electrical utility company.*~~))

(4) Battery Power and Dampers. Where a storage battery is used for control or signal power or as the means of starting the prime mover, it shall be suitable for the purpose and shall be equipped with an automatic charging means independent of the generator set. Where the battery charger is required for the operation of the generator set, it shall be connected to the emergency system. Where power is required for the operation of dampers used to ventilate the generator set, the dampers shall be connected to the emergency system.

(5) Auxiliary Power Supply. Generator sets that require more than 10 seconds to develop power shall be permitted if an auxiliary power supply energizes the emergency system until the generator can pick up the load.

(6) Outdoor Generator Sets. Where an outdoor housed generator set is equipped with a readily accessible disconnecting means 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. The disconnecting means shall meet the requirements of 225.36.

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

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

(D) Separate Service. Where approved by the authority having jurisdiction as suitable for use as an emergency source of power, an additional service shall be permitted. This service shall be in accordance with the applicable provisions of Article 230 and the following additional requirements:

(1) Separate service drop or service lateral

(2) Service conductors sufficiently remote electrically and physically from any other service conductors to minimize the possibility of simultaneous interruption of supply

(E) Fuel Cell System. Fuel cell systems used as a source of power for emergency systems shall be of suitable rating and capacity to supply and maintain the total load for not less than 2 hours of full-demand operation.

Installation of a fuel cell system shall meet the requirements of Parts II through VIII of Article 692.

Where a single fuel cell system serves as the normal supply for the building or group of buildings concerned, it shall not serve as the sole source of power for the emergency standby system.

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(F) Unit Equipment. Individual unit equipment for emergency illumination shall consist of the following:

(1) A rechargeable battery

(2) A battery charging means

(3) Provisions for one or more lamps mounted on the equipment, or shall be permitted to have terminals for remote lamps, or both

(4) A relaying device arranged to energize the lamps automatically upon failure of the supply to the unit equipment

The batteries shall be of suitable rating and capacity to supply and maintain at not less than 87½ percent of the nominal battery voltage for the total lamp load associated with the unit for a period of at least 1½ hours, or the unit equipment shall supply and maintain not less than 60 percent of the initial emergency illumination for a period of at least 1½ hours. Storage batteries, whether of the acid or alkali type, shall be designed and constructed to meet the requirements of emergency service.

Unit equipment shall be permanently fixed in place (i.e., not portable) and shall have all wiring to each unit installed in accordance with the requirements of any of the wiring methods in Chapter 3. Flexible cord-and-plug connection shall be permitted, provided that the cord does not exceed 900 mm (3 ft) in length. The branch circuit feeding the unit equipment shall be the same branch circuit as that serving the normal lighting in the area and connected ahead of any local switches. The branch circuit that feeds unit equipment shall be clearly identified at the distribution panel. Emergency luminaires that obtain power from a unit equipment and are not

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part of the unit equipment shall be wired to the unit equipment as required by 700.9 and by one of the wiring methods of Chapter 3.

Exception: In a separate and uninterrupted area supplied by a minimum of three normal lighting circuits, a separate branch circuit for unit equipment shall be permitted if it originates from the same panelboard as that of the normal lighting circuits and is provided with a lock-on feature.

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

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

Where high-intensity discharge lighting such as high- and low-pressure sodium, mercury vapor, and metal halide is used as the sole source of normal illumination, the emergency lighting system shall be required to operate until normal illumination has been restored.

<u>Exit signs with open bottom lighting shall not be used in lieu of a required pathway light unless specifically approved for the purpose.</u>

<u>Exit illumination (pathway lighting) and emergency area lighting shall comply with Chapter 10 of the *Seattle Building Code*.</u>

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Exception: Alternative means that ensure emergency lighting illumination level is maintained shall be permitted when preapproved by the authority having jurisdiction.

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700.27 Coordination. Emergency system(s) overcurrent devices shall be selectively coordinated with supply side overcurrent protective devices.

Exception No.1: Selective coordination shall not be required in (1) or (2):

(1) Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exists on the transformer secondary,

(2) Between overcurrent protective devices of the same size (ampere rating) in series.

Exception No. 2: When an electrical engineer provides stamped fault current calculations, the emergency system(s) overcurrent protective devices may be selectively coordinated with emergency system supply side overcurrent protective devices for faults with a duration of 0.1 seconds and longer.

***

Section 32. The following sections of Article 701 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 701

Legally Required Standby Systems

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701.8 Signals. Audible and visual signal devices shall be provided((~~where practicable,~~)) for the purposes described in 701.8(A), (B), and (C).

(A) Derangement. To indicate derangement of the standby source.

(B) Carrying Load. To indicate that the standby source is carrying load.

(C) Not Functioning. To indicate that the battery charger is not functioning.

FPN: For signals for generator sets, see NFPA 110-2005, *Standard for Emergency and Standby Power Systems*.

FPN: WAC 296-46B-70.008(1) sets forth in-sight requirements; This WAC provision is by this reference made part of the 2008 *Seattle Electrical Code.*

***

II. Circuit Wiring

701.10 Wiring Legally Required Standby Systems. The legally required standby system wiring shall be kept entirely independent of all other wiring and equipment and shall not enter the same raceway, cable, box, or cabinet with other wiring for the following systems:

(1) Shaft pressurization systems installed according to Chapter 9 of the *Seattle Building Code*, and

(2) Elevators serving as an accessible means of egress according to Chapter 10 of the *Seattle Building Code.*

Other legally required standby system wiring shall be permitted to occupy the same raceways, cables, boxes, and cabinets with other general wiring.

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FPN: Stretcher-sized elevator cars are required by *Seattle Building Code* Chapter 30 to be supplied with power from a legally required standby or emergency system.

III. Sources of Power

701.11 Legally Required Standby Systems. Current supply shall be such that, in the event of failure of the normal supply to, or within, the building or group of buildings concerned, legally required standby power will be available within the time required for the application but not to exceed 60 seconds. The supply system for legally required standby purposes, in addition to the normal services to the building, shall be permitted to comprise one or more of the types of systems described in 701.11(A) through (F). Unit equipment in accordance with 701.11(G) shall satisfy the applicable requirements of this article.

In selecting a legally required standby source of power, consideration shall be given to the type of service to be rendered, whether of short-time duration or long duration.

Consideration shall be given to the location or design, or both, of all equipment to minimize the hazards that might cause complete failure due to floods, fires, icing, and vandalism.

FPN: Assignment of degree of reliability of the recognized legally required standby supply system depends on the careful evaluation of the variables at each particular installation.

(A) Storage Battery. A storage battery shall be of suitable rating and capacity to supply and maintain at not less than 87½ percent of system voltage the total load of the circuits supplying legally required standby power for a period of at least 1½ hours.

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Batteries, whether of the acid or alkali type, shall be designed and constructed to meet the service requirements of emergency service and shall be compatible with the charger for that particular installation.

For a sealed battery, the container shall not be required to be transparent. However, for the lead acid battery that requires water additions, transparent or translucent jars shall be furnished. Automotive-type batteries shall not be used.

An automatic battery charging means shall be provided.

(B) Generator Set.

(1) Prime Mover-Driven. For a generator set driven by a prime mover acceptable to the authority having jurisdiction and sized in accordance with 701.6, means shall be provided for automatically starting the prime mover upon failure of the normal service and for automatic transfer and operation of all required electrical circuits. A time-delay feature permitting a 15-minute setting shall be provided to avoid retransfer in case of short-time re-establishment of the normal source.

(2) Internal Combustion Engines as Prime Mover. Where internal combustion engines are used as the prime mover, an on-site fuel supply shall be provided with an on-premises fuel supply sufficient for not less than 2 hours' full-demand operation of the system.

(3) Dual Fuel Supplies. Prime movers shall not be solely dependent on a public utility gas system for their fuel supply or on a municipal water supply for their cooling systems. Means shall be provided for automatically transferring one fuel supply to another where dual fuel supplies are used.

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~~*Exception: Where acceptable to the authority having jurisdiction, the use of other than on-site fuels shall be permitted where there is a low probability of a simultaneous failure of both the off-site fuel delivery system and power from the outside electrical utility company.*~~

(4) Battery Power. Where a storage battery is used for control or signal power or as the means of starting the prime mover, it shall be suitable for the purpose and shall be equipped with an automatic charging means independent of the generator set.

(5) Outdoor Generator Sets. Where an outdoor housed generator set is equipped with a readily accessible disconnecting means 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. The disconnecting means shall meet the requirements of 225.36.

(C) Uninterruptible Power Supplies. Uninterruptible power supplies used to provide power for legally required standby systems shall comply with the applicable provisions of 701.11(A) and (B).

(D) Separate Service. Where approved, a separate service shall be permitted as a legally required source of standby power. This service shall be in accordance with the applicable provisions of Article 230, with separate service drop or lateral sufficiently remote electrically and physically from any other service to minimize the possibility of simultaneous interruption of supply from an occurrence in another service.

(E) Connection Ahead of Service Disconnecting Means. Where acceptable to the authority having jurisdiction, connections located ahead of and not within the same cabinet, enclosure, or

vertical switchboard section as the service disconnecting means shall be permitted. The legally required standby service shall be sufficiently separated from the normal main service disconnecting means to prevent simultaneous interruption of supply through an occurrence within the building or groups of buildings served.

FPN: See 230.82 for equipment permitted on the supply side of a service disconnecting means.

(F) Fuel Cell System. Fuel cell systems used as a source of power for legally required standby systems shall be of suitable rating and capacity to supply and maintain the total load for not less than 2 hours of full-demand operation.

Installation of a fuel cell system shall meet the requirements of Parts II through VIII of Article 692.

Where a single fuel cell system serves as the normal supply for the building or group of buildings concerned, it shall not serve as the sole source of power for the legally required standby system.

(G) Unit Equipment. Individual unit equipment for legally required standby illumination shall consist of the following:

(1) A rechargeable battery

(2) A battery charging means

(3) Provisions for one or more lamps mounted on the equipment and shall be permitted to have terminals for remote lamps

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(4) A relaying device arranged to energize the lamps automatically upon failure of the supply to the unit equipment

The batteries shall be of suitable rating and capacity to supply and maintain at not less than 87½ percent of the nominal battery voltage for the total lamp load associated with the unit for a period of at least 1½ hours, or the unit equipment shall supply and maintain not less than 60 percent of the initial legally required standby illumination for a period of at least 1½ hours. Storage batteries, whether of the acid or alkali type, shall be designed and constructed to meet the requirements of emergency service.

Unit equipment shall be permanently fixed in place (i.e., not portable) and shall have all wiring to each unit installed in accordance with the requirements of any of the wiring methods in Chapter 3. Flexible cord-and-plug connection shall be permitted, provided that the cord does not exceed 0.9 m (3 ft) in length. The branch circuit feeding the unit equipment shall be the same branch circuit as that serving the normal lighting in the area and connected ahead of any local switches. Legally required standby luminaires that obtain power from a unit equipment and are not part of the unit equipment shall be wired to the unit equipment by one of the wiring methods of Chapter 3.

Exception: In a separate and uninterrupted area supplied by a minimum of three normal lighting circuits, a separate branch circuit for unit equipment shall be permitted if it originates from the same panelboard as that of the normal lighting circuits and is provided with a lock-on feature.

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701.18 Coordination. Legally required standby system(s) overcurrent devices shall be selectively coordinated with all supply side overcurrent protective devices.

Exception No. 1: Selective coordination shall not be required in (1) or (2):

(1) Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exists on the transformer secondary,

(2) Between overcurrent protective devices of the same size (ampere rating) in series.

Exception No. 2: When an electrical engineer provides stamped fault current calculations, the overcurrent protective devices of each legally required standby system may be selectively coordinated with legally required standby system supply side overcurrent protective devices for faults with a duration of 0.1 seconds and longer.

***

Section 33. The following sections of Article 708 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 708

Critical Operations Power Systems

***

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708.54 Coordination. Critical operations power system(s) overcurrent protective devices shall be selectively coordinated with all supply side overcurrent protective devices.

Exception: When an electrical engineer provides stamped fault current calculations, the critical operations power system(s) overcurrent protective devices may be selectively coordinated with all critical operations power supply side overcurrent protective devices for faults with a duration of 0.1 seconds and longer.

***

Section 34. The following sections of Article 760 of the National Electrical Code, 2008 Edition, are amended as follows:

ARTICLE 760

Fire Alarm System

***

760.30 Fire Alarm Circuit Identification. Fire Alarm circuits shall be identified at terminal and junction locations in a manner the helps to prevent unintentional signals on fire alarm system circuit(s) during testing and servicing of other systems.

FPN: WAC 296-46B-760, which involves device and junction box identification requirements is by this reference made part of the 2008 *Seattle Electrical Code.*

***

Section 35. This ordinance shall take effect and be in force thirty (30) days from and after its approval by the Mayor, but if not approved and returned by the Mayor within ten (10) days after presentation, it shall take effect as provided by Municipal Code Section 1.04.020.

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Passed by the City Council the 27th day of April, 2009, and signed by me in open session in authentication of its passage this 27th day of April, 2009.

President _____ of the City Council

Approved by me this 6th day of May, 2009.

Gregory J. Nickels, Mayor

Filed by me this 6th day of May, 2009.

Carol M. Shank

Acting City Clerk

(Seal)

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Form revised February 6, 2008

FISCAL NOTE FOR NON-CAPITAL PROJECTS

Department:	Contact Person/Phone:	DOF Analyst/Phone:
Planning and Development	Vicki Baucom / 206-233-2757	Karen Grove / 206-684-5805

Legislation Title:
An ordinance relating to building and construction codes amending Section 22.300.016 of the Seattle Municipal Code to adopt the 2008 National Electrical Code with Seattle amendments and to adopt by reference specific portions of the Washington Administrative Code Chapter 296-46B (Washington State Electrical Rule).

- **Summary of the Legislation:** This bill adopts the 2008 National Electrical Code, as amended, and is a regularly scheduled triennial adoption. The proposals in this bill comply with the Revised Code of Washington (19.28.010) which requires that Seattle must have "an equal, higher, or better standard of construction and an equal, higher, or better standard of materials, devices, appliances, and equipment" than those required by the State.

- **Background:** Many of the Seattle amendments to the 2008 NEC are amendments that exist in the 2005 code, worked well in the past and are proposed for re-adoption into this bill. A detailed list of proposed amendments is included with this fiscal note as Attachment A.

  The most significant proposals include the following:

  1. Seattle proposes to amend the NEC to define the duration of a fault requiring selective coordination.

     This amendment involves the sequencing (selective coordination) of breaker- or fuse-trips triggered by an electrical short-circuit or ground-fault. Currently, the NEC does not define the duration of a fault requiring selective coordination. The purpose of selective coordination is to minimize system shut-down, damage to equipment and arc-flash energy exposure to maintenance personnel working on electrical systems.

     The proposed amendment adds an exception to the selective coordination requirements that allows coordinated tripping of overcurrent protective devices for faults with a duration of 0.1 seconds or longer when an electrical engineer affixes a professional stamp to the documentation.

     There is significant support for the proposal; however, a segment of the industry is opposed to any change to the selective coordination requirements contained in NEC. Other states have adopted or are adopting similar code amendments defining the fault duration as 0.1 seconds or longer include the states of Oregon, Florida, and California (health care facilities).

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2. Looking to the future, several new code sections are added to accommodate electric vehicle charging systems.

A key component of this proposal requires that residential occupancies have adequate electrical capacity and room on the electrical service panel to add a feeder to serve the electric vehicle charging load. A new table is also added to assist designers in calculating the additional load for the structure. The proposal allows multifamily dwellings to include the vehicle charging demand load to be considered into the dwelling unit calculations and it requires the designer to designate a location for the charging system feeder and to ensure such location has adequate space to accommodate the required working clearances. The proposal, however, does not require the installation of equipment to charge electric vehicles.

3. Rather than adopting a less protective State amendment (WAC 296-46B-210.12) limiting arc-fault circuit-interrupter protection (AFCI) devices in dwelling unit bedroom spaces only, the Seattle proposal retains the more protective provisions of the NEC (Section 210.12(B)) which requires AFCI devices in most rooms of a dwelling unit. While this provision modestly increases the cost of construction, it provides additional protection, including fire protection, by detecting electrical malfunctions and interrupting the flow of electric current. A coalition of jurisdictions in the region including Bellevue, Kirkland, Renton, Redmond, Des Moines, Vancouver, SeaTac, Marysville and Longview, have indicated their intention to follow the more protective NEC provisions.

- *Please check one of the following:*

X This legislation does not have any financial implications.

Please list attachments to the fiscal note below:

Attachment A: Detailed List of Proposed New Changes to the Seattle Electrical Code

Attachment B: A copy of a proposal for NEC 517.30(F), Selective Coordination, submitted by Mr. Walter Vernon, President of engineering firm Mazzetti & Associates, with Jim Duncan's (Principal and Chief Electrical Engineer of Sparling) hand-written note that the proposal was unanimously accepted on 1/15/09 by NEC Code Panel 15 which is responsible for Article 517 relating to health care facilities. Thus, it appears likely that the NEC will include a similar selective coordination standard in its 2011 Code.

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Attachment A

Detailed List of Proposed New Changes to the Seattle Electrical Code

Section	Subject	Description of amendment
Article 80 Generally	Administration	This article is amended to align with other construction codes. The result is consistency in the administration and enforcement of the codes.
80.51	Application and plans	New to this section are requirements that plans be submitted with permit applications for solar and renewable energy installations. Large systems, those greater than 26 kW require plan sets while smaller systems require line drawings for inspectors to use.
Article 90	Introduction	The text of this section was deleted and reserved for future use.
110.21	Definition of Marking and labeling	This new amendment clarifies the difference between Manufacturer's Marking and other marking and labeling, as well as detailing the minimum size of lettering and types of labeling or marking allowed.
215.14	Power supply for dwelling units	This new amendment requires that wiring not pass through one dwelling unit to supply power to a different dwelling unit. As a result, the amendment provides a greater level of shock-hazard protection for anyone working on a dwelling unit electrical system.
Tables 220.3 & 220.57 and §§ 220.57, 220.84, 625.27	Electric vehicle outlet power needs	New amendments require that power needs for electric vehicle charging be included as a part of a residential structure's demand loads using a new table. Also, the service panel is required to plan for future installation of a feeder panel to serve parking area charging stations in residential occupancies.
230.54	Service wire length at weatherhead	Each service-entrance conductor wire is required to be an additional 12 inches in length when several service-entrance raceways are grouped together to connect to a single utility drop. The existing requirement of eighteen inches of wire is not long enough to safely connect multiple conductors to the single utility drop.
230.95	Ground fault protection testing	Electrical installations must have the ground-fault protection equipment tested before it is energized, including new installations.
404.13	Knife Switches	This amendment clarifies the term "interlocking" for this subsection of Code.
450.19	Transformer location	This amendment adds new illustrations that clarify where transformers can be located.
450.27	Oil-insulated transformers outdoors	New code language and two new illustrations clarify the area in which an outdoor transformer may be installed to maintain a safe distance from structures and openings in structures.
600.9	Sign distance from high voltage lines	This amendment codifies a Seattle City Light requirement to maintain a safe distance between overhead power lines and electric signs and lighting.

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620.62, 700.27, 701.18, 708.54	Selective coordination	An exception was added to each of these sections to that does not require instantaneous selective coordination but, rather, allows selective coordination for overcurrent protective devices for faults that last 0.1 seconds or longer. In order to qualify for the exception, an electrical engineer must document that a certain level of safety exists by coordination of tripping overcurrent protective devices and the engineer must affix their professional stamp to the documentation.
Various		The Seattle amendments propose in various places in the ordinance to (1) adopt by reference certain WAC provisions, as necessary, (2) delete existing requirements but reserve the specific subsection number to ensure Seattle's amendments more easily track the NEC numbering system, or (3) strike an article, section, subsection or some portion of NEC requirements.

ACCEPTED BY CODE PANEL
1/15/09 - UNANIMOUS VOTE

15-90 Log #4129 NEC-P15 Final Action:
(517.30(F))

Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Add new text to read as follows:

(F) Selective Coordination. Overcurrent protective devices serving the essential electrical system shall be selectively coordinated for times longer than 0.1 seconds.

Exception No. 1: Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exists on the transformer secondary.

Exception No. 2: Isolated power systems inherently comply with this selective coordination requirement.

Substantiation: The rationale for this proposal has two elements.

First, NFPA 99 is responsible for the performance of the electrical systems in health care facilities. That committee takes very seriously the charge of making health care facilities as safe as humanly possible for the patients we serve, including protecting them from electrical outages that might be caused by un-coordinated electrical systems. However, as designers and operators of these systems, we recognize that coordination is not a pure good in itself, and that there are competing hazards that can, in some cases, trump the ideal of perfect coordination. As chair of the electrical Systems Technical Committee for NFPA 99, I presided over two meetings to review comments from the public, including extensive presentations on this topic from all sides. We debated this issue extensively, testing out the various theories and data reported. In the end, by a clear majority, the committee adopted the performance criteria that, in our judgment, best balances the clear and compelling need for a well-coordinated electrical system with the other considerations involved. The NFPA 99 2010 Edition will include the language proposed here, and the NEC should be changed to prevent confusion in the field.

Second, we will repeat some of the technical arguments against an unfettered pursuit of perfect coordination on health care facilities, assembled by a group of electrical engineers including, by the way, the State of California Office of Statewide Health Planning and Development, who have a state amendment to NFPA 70 specifically excluding health care facilities from all coordination requirements due to the problems it creates.

Selective coordination is only one of several competing factors that must be considered in the selection of appropriate overcurrent protective devices (OCPDs) in health care facilities. Other factors that must be considered in the selection of overcurrent protective devices include: arc flash risk hazard, equipment damage, and reduced risk of extended outages; all of which have direct effects on both staff and patient safety. Mandating selective coordination as the sole determining factor in OCPD selection will result in diminished reliability of the essential electrical system.

The electrical distribution systems in health care facilities are different from those in other buildings. they generally have more levels of distribution between the service and the load thus greatly complicating the coordination task, and creating other potential hazards for the unwary who zealously work to maximize a single element of the overall safety equation. Unfortunately, the code requirement in Article 700, when strictly applied to health care facilities, has not accomplished its primary goal of making electrical systems more reliable. Instead, in many instances, it creates less reliable electrical distribution systems in most instances. Some reasons for this are:

- Achieving selective coordination throughout the entire electrical distribution system requires a delay in the upstream overcurrent devices (to wait for the downstream devices to clear). Delaying the operation of these overcurrent devices can lead to the arc flash levels being driven to dangerously high levels without interruption. Numerous engineers have reported this phenomenon in their designs since the 700 provisions for strict selective coordination began to be applied to health care facilities. G,iven the critical nature of our health care occupancies design engineers are forced to make tough decisions for our clients; de-energize equipment to maintain and repair it and expose the patient/building occupant to a potentially harmful electrical outage or keep the electrical equipment energized and expose the electrical worker to dangerously high arc flash levels. Lower arc flash levels, resulting from the acceptance of the current proposals, will help achieve the goal of making our healthcare electrical systems safer for both patients and electrical workers.
- Many of the members of the 99 committee have been asked to provide forensic engineering analysis for electrical distribution system disruptions. The vast majority of those disruptions resulted in what were initially perceived to be a mis-coordinated system issue. In reviewing the evidence associated with these disruptions we found that most, if not all, of these disruptions were due to low level arc faults to ground. These low level ground faults resulted in the activation of the nearest upstream ground fault device and not the overcurrent device (without ground fault) directly upstream of the fault. By virtue of other sections in NFPA 70 specifically 517.17(B), (1) & (2)) we are not allowed to install further downstream ground fault devices, therefore, not being able to enhance ground fault system coordination. Unfortunately, the current selective coordination verbiage in NFPA 70 paragraph 700.27, 701.18 & 708.54 does not address (nor can it address) the ground fault coordination issue that currently exist and is the most prevalent type of system fault. The

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addition of the "longer than 0.1 seconds" language as currently proposed does not diminish the goal of a selectively coordinated system since the vast majority of faults do not exist the 0.1 second or less tripping range.

- The selective coordination requirement as currently written in NFPA 70 requires the design engineer to limit the number of electrical equipment levels in order to attempt full selective coordination. This sometimes requires the elimination of electrical devices that would normally have been installed for isolation and maintenance reasons. These types of omissions will require the owner to take larger portions of this electrical system out of service simultaneously when performing off-line maintenance. Many individuals/entities try to make this a fuse versus circuit breaker issue. This argument only clouds the issue and does not get to the real fact that the current selective coordination requirement in NFPA 70 does not enhance our electrical distribution system. This proposal interjects logic and real world practical experience into the selective coordination topic.

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