



2005
SEATTLE
ELECTRICAL CODE
SUPPLEMENT

Quick Reference

ORDINANCE 121919
Effective OCTOBER 22, 2005

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DEPARTMENT OF PLANNING AND DEVELOPMENT

Permits and Information

Applicant Services Center

Seattle Municipal Tower
20th floor
700 Fifth Avenue
(206) 684-8850

Electrical Counter

Seattle Municipal Tower
20th floor
700 Fifth Avenue
(206) 684-8464

Inspection Requests

(206) 684-8900
(24-hour recording)

Inspectors' Office Hours:

7:30-9:00 a.m.
Monday through Friday

Inspectors' Office Location:

Seattle Municipal Tower
21st & 22nd floors
(206) 684-8950

Mailing Address:

700 Fifth Avenue, Suite 2000
P.O. Box 34019
Seattle, WA 98124-4019

DEPARTMENT OF PLANNING AND DEVELOPMENT

If you would like to receive occasional email messages notifying you of future amendments and errata to the Seattle Electrical Code, send an email to maureen.traxler@seattle.gov with “Electrical Code notification” in the subject line.

If you have questions about this service, contact Maureen Traxler at 206.233.3892 or maureen.traxler@seattle.gov.

CITY OF SEATTLE

2005 ELECTRICAL CODE SUPPLEMENT

ORDINANCE 121919
Effective October 22, 2005

**SUPPLEMENT TO THE 2005 EDITION
OF THE NATIONAL ELECTRICAL CODE**

Issued by the Department of Planning and Development

Diane M. Sugimura, *Director*
Richard G. Alford, *Chief Electrical Inspector*

The staff of DPD wishes to extend its appreciation to the volunteers who devoted many hours to development of the 2005 edition of the Seattle Electrical Code. This Code would not be possible without the cooperative effort of the Construction Codes Advisory Board (CCAB), the CCAB Electrical Code Review Committee, the Washington State Department of Labor and Industries, and the Seattle Fire Department. The City is deeply indebted to these volunteers for their hard work and expertise.

Electrical Code Review Committee

Chris Porter, Chair

Joe Andre

Greg Batie

Pat Elwood

Keith Lane

Jack Oxford

Gary Price

Warren Shill

Richard White

NOTATIONS USED IN THE SEATTLE ELECTRICAL CODE SUPPLEMENT

The following notations are used in the 2005 *Seattle Electrical Code Supplement* to aid the reader.

The *Seattle Electrical Code Supplement* consists of amendments to the *National Electrical Code (NEC)*. *NEC* language deleted by Seattle amendment has a line drawn through it and has double parentheses around it. Language that is added by Seattle amendment is underlined. Article 80 of the Supplement is entirely unique to the Seattle Supplement and does not have underlining or strike through.

Changes in the *NEC* and Seattle amendments since the 2002 editions are shown by markings in the margins.

- | A solid vertical line in the margin indicates NFPA has revised the section since the 2002 edition of the *National Electrical Code* was published.
- : A dashed vertical line in the margin indicates Seattle has revised the section since the 2002 edition of the *Seattle Electrical Code Supplement* was published.
- A circle in the margin indicates that text has been deleted from the *National Electrical Code* since the 2002 edition.
- ▶ A triangle in the margin indicates that a Seattle amendment has been deleted since the 2002 edition of the *Seattle Electrical Code Supplement* was adopted.

Note: Article 80 is entirely Seattle amendments to the National Electrical Code and is not underlined.

ARTICLE 80

Application and Enforcement of this Code

I. Application of the Seattle Electrical Code

80.1 Title. This 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 code."

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 code is intended to provide for and promote the health, safety and welfare of the general public, and not to create or otherwise establish or designate any particular class or group of persons who will or should be especially protected or benefited by the terms of this code. This code is not intended as a design specification nor an instruction manual for untrained persons.

(B) Chapter 296-46B Washington Administrative Code. An additional purpose of this code is to provide equal, higher or better standards of construction and/or 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). Those sections of the Washington State Electrical Code amending the *National Electric Code*, as set forth at Chapter 296-46B of the Washington Administrative Code (WAC), are adopted except those sections that are amended by or are in conflict with this code. The following administrative sections of Chapter 296-46B WAC are superseded by this code: WAC 296-46B-010 (1) - (13), (15), (16), (19), (20), (23), (24); WAC 296-46B-030; and WAC 296-46B-110 030 (6)-(13).

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. 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 service point as defined in this code. The installation and maintenance of all service conductors up to the point of connection to the consumer'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 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 code may continue to be used provided such use was legal at the time of the passage of this 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 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.

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.

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. 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 code or evidence that any material or construction does not conform to the requirements of this 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 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. The authority having jurisdiction shall retain reports of tests.

80.6 Utilization Equipment and Alternate Materials and Methods of Wiring. This code does not prevent the use of any utilization equipment, material, method or design of wiring not specifically allowed or prohibited by

this code, provided the same has been approved and its use authorized by the authority having jurisdiction.

The authority having jurisdiction may approve an alternate, provided he/she finds that the proposed alternate complies with the provisions of this 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. This section supersedes the requirements of WAC 296-46B-030.

80.7 Modifications. The authority having jurisdiction may grant modifications for individual cases whenever there are practical difficulties involved in carrying out the provisions of this code. The authority having jurisdiction must first find that the strict application of this code is impractical under the circumstances and that the modification is in conformity with the intent and purpose of this code and does not lessen any fire protection requirements or any degree of structural integrity. The authority having jurisdiction may, but is not required to, record the approval of modifications and any relevant information in the files of the authority having jurisdiction or on the approved permit plans.

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 code, it shall be construed to mean the Director of the Department of Planning and Development, 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 code.

Compliance with the requirements of this code shall be the obligation of the owner of the building, structure or premises, the duly authorized agent of the owner, or other person responsible for the condition or work, and not of the City or any of its officers or employees.

(B) Deputies. 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 such employees as may be necessary to carry out the functions of the Department of Planning and Development.

(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 code.

(D) Stop Orders. Whenever any installation, alteration, repair or removal of electrical work is being done contrary to the provisions of this code, or in the event of dangerous or unsafe conditions related to electrical work, the authority having jurisdiction may 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.

(E) Authority to Disconnect Utilities. The authority having jurisdiction shall have the authority to disconnect or order discontinuance of any utility service or energy supply to buildings, structures or equipment therein regulated by this code in cases of emergency. The authority having jurisdiction may enter any building or premises to disconnect utility service or energy supply. 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 has been placed in a safe condition and approved by the authority having jurisdiction.

(F) Liability. Nothing contained in this code is intended to be, nor shall be construed to create or form the basis for any liability on the part of the City or its officers, employees or agents, for any injury or damage resulting from the failure of a building to conform to the provisions of this code, or by reason or in consequence of any inspection, notice, order, certificate, permission or approval authorized or issued or done in connection with the implementation or enforcement of this code, or by reason of any action or inaction on the part of the City related in any manner to the enforcement of this code by its officers, employees or agents.

Neither the authority having jurisdiction nor any employee charged with the enforcement of this code shall be personally liable for any damage that accrues to

persons or property as a result of any act or omission committed in the discharge of their duties, provided that the authority having jurisdiction or employee acted in good faith and without malice.

(G) Code Interpretation or Explanation. Electrical inspectors may give information as to the meaning or application of the *National Electrical Code* and the Seattle Supplement, but shall not lay out work or act as consultants for contractors, owners or users.

(H) Cooperation of Other Officials and Officers. The authority having jurisdiction may request, and shall receive 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. The authority having jurisdiction may inspect any new or existing electrical installation or equipment, and if the installation or equipment is found to be maintained or used in an unsafe condition or found to be in violation of this code, the authority having jurisdiction is authorized to serve upon the owner 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 code.

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.

80.13 Violations and Penalties.

(A) Violations. It shall be a violation of this code for any person, firm or corporation to erect, construct, enlarge, repair, move, improve, remove, convert or demolish, equip, occupy, or maintain any building or structure in the City, contrary to or in violation of any of the provisions of this code.

It shall be a violation of this code for any person, firm or corporation to aid, abet, counsel, encourage, hire, commend, induce or otherwise procure another to violate or fail to comply with any of the provisions of this code.

It shall be a violation of this code for any person, firm or corporation to use any materials or to install any device, appliance or equipment which does not comply with applicable standards of this code or which has not been approved by the authority having jurisdiction.

(B) Notice of Violation. If after investigation the authority having jurisdiction determines that standards or requirements of this code have been violated, the authority having jurisdiction may serve a notice of violation upon the owner or other person responsible for the action or condition. The notice of violation shall state the standards or requirements violated, shall state what corrective action, if any, is necessary to comply with the standards or requirements, and shall set a reasonable time for compliance. The notice shall be served upon the owner or other responsible person by personal service, certified mail with return receipt requested or registered mail with return receipt requested or registered mail addressed to the last known address of such person. In addition, a copy of the notice may be posted at a conspicuous place on the property. The notice of violation shall be considered an order of the authority having jurisdiction. Nothing in this subsection shall be deemed to limit or preclude any action or proceeding pursuant to this code, and nothing in this section shall be deemed to obligate or require the authority having jurisdiction to issue a notice of violation prior to the imposition of civil or criminal penalties in this section.

(C) Civil Penalty. 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 \$500 per day for each violation from the date the violation occurs or begins until compliance is achieved.

(D) Criminal Penalties.

(1) Anyone violating or failing to comply with any order issued by the authority having jurisdiction pursuant to this code shall, upon conviction thereof, be punished by a fine of not more than \$1,000 or by imprisonment for not more than 360 days, or by both such fine and imprisonment. Each day's violation or failure to comply shall constitute a separate offense.

(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) Additional Relief. The authority having jurisdiction may seek legal or equitable relief to enjoin any acts or practices and abate any condition that constitutes a violation of this code when civil or criminal penalties are inadequate to effect compliance.

80.14 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 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 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 Chapter 3.02 of the Seattle Municipal Code.

80.16 Construction Codes Advisory Board. An Electrical Code Committee of the Construction Codes Advisory Board, as established in Section 105 of the Seattle Building Code, may examine proposed new editions of, and amendments to this code and any proposed administrative rules promulgated to enforce this code. The Electrical Code Committee may make recommendations to the authority having jurisdiction and to the City Council relating to this code and

administrative rules. The committee shall be called on an as-needed basis for the Construction Codes Advisory Board.

80.17 Appeals. Appeals from decisions or actions pertaining to the administration and enforcement of this code shall be addressed to the authority having jurisdiction. The 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 panel's review shall be advisory only.

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 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; 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) **Permits 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.
- (3) The setting of meters by the 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 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 family residences, 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 work is covered under the issuance of an elevator permit.

Exemption from the permit requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this 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, 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.

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 state the name and address of the owner or occupant in possession of the building or premises where the work is to be done, the name of the licensed contractor, if any, that will be

responsible for the installation, and such other information as the authority having jurisdiction may require. 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;
- (d) services, feeders and power supplies for emergency, legally required standby or fire pump systems;
- (e) any proposed installation the scope of which covers more than 2,500 square feet;
- (f) any proposed 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), and WAC 296-46B-010 Tables 010-1 and 010-2.

Exception: Plans and specifications shall not be required for installations in one- and two-family dwellings that can be adequately described on the application form.

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

(2) Clarity of Plans. Plans shall be drawn to a clearly indicated and commonly accepted scale of not less than 1/8 inch to 1 foot upon substantial paper 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 and maximum size of 41 inches by 54 inches. Plans shall indicate the nature and extent of the work proposed and shall show in detail that it will conform to the provisions of this code. All 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.

(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.
- (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.

(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 will review the application. When the application and plans are found to be in compliance with the Seattle Electrical Code, the Department will approve the application and plans as ready for issuance. Neither the permit nor the plans shall be issued until the remainder of the fee is paid and the electrical contractor's name and license number is placed on the permit.

80.52 Permits.

(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 code. Holders of such permits may proceed at their own risk without assurance that the permit for the entire building or structure will be granted.

Exception No. 2: A permit may be issued for work to commence prior to the approval of plans, if such approval is delayed beyond 10 working days after the plans have been submitted for examination. The holders of such permits may proceed at their own risk, with the understanding that any work undertaken prior to approval of plans shall be done in accordance with the provisions of this code and in accordance with the plans as subsequently approved.

(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 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 substitutions and changes are made during construction, approval shall be secured prior to execution; however, the electrical inspector may approve minor modifications 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, prior to occupancy. These changes shall conform to the requirements of this code and other pertinent laws and ordinances.

(4) Requirement for License. No electrical permit shall be issued to an applicant who is engaging in, conducting

or carrying on the business of installing wires or equipment to convey electric current or of installing apparatus to be operated by electric current unless the applicant possesses a valid State of Washington license as required by RCW 19.28. The licensed installer responsible for the work shall be identified on the electrical permit.

Exception: Persons not possessing a license may obtain an electrical permit in order to do electrical work at a residence, farm, place of business or other property that they own as described in RCW 19.28.261.

(5) Cancellation of Permit Application. 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 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 not be construed to be a permit for, or an approval of, any violation of any of the provisions of this code or any other ordinance. 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 not prevent the authority having jurisdiction from later requiring the corrections of errors in the plans. 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 not prevent the authority having jurisdiction from requiring correction of conditions found to be in violation of this code or any other ordinance of the City. The period of time for which a permit is issued shall 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.

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

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) Application for renewal shall be made within the thirty-day period immediately preceding the date of expiration of the permit;
- (b) The work authorized by the permit has been started and is progressing at a rate approved by the authority having jurisdiction;
- (c) 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) 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) The work authorized by the permit is substantially underway and progressing at a rate approved by the authority having jurisdiction.

Permits may also be renewed where commencement or completion of the work authorized by the permit was 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 b and 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 code whenever the permit is issued in error or on the basis of incorrect information, or in violation of any ordinance or regulation or any provision of this code.

(F) Permit for Temporary Installations. The authority having jurisdiction may issue permits 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 code.

80.53 Permit Fees. A fee for each electrical permit and for other activities related to the enforcement of this code shall be paid as set forth in the 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 the owner of the property, the owner's authorized agent, or the person designated by the owner/agent to do the work authorized by a permit to 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 person requesting any inspections required by this 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 liable for expense entailed 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 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 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.

(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 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 code and other laws enforced by the authority having jurisdiction.

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

ARTICLE 90

Introduction

90.1 Purpose.

(A) (~~Practical Safeguarding.~~ The purpose of this Code is the practical safeguarding of persons and property from hazards arising from the use of electricity.)) See Section 80.2(A).

(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*.

90.2 Scope. See Section 80.3.

~~((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~~
 FPN to (2): For additional information concerning such installations in an industrial or multibuilding complex, see ANSI C2-2002, *National Electrical Safety Code*.
- ~~(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~~
- ~~(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, rights of way, or by other agreements either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations, or~~
 - ~~e. 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 bodies, such as state regulatory commissions, Federal Energy Regulatory Commission, and 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.

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 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.

Terms and phrases used in this code but not defined in this code shall be as defined in the Seattle Building Code and the Seattle Mechanical Code.

► **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.

ARTICLE 110
Requirements for Electrical Installations

110.13 Mounting, ~~(and)~~ Cooling and Location 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) Location. No electrical equipment shall project beyond the face of the wall in halls, corridors or other locations that would reduce the width required by the Building Code for such locations. No electrical equipment such as pull boxes, junction boxes, conduit, panels, transformers, water heaters, motors, compressors, or similar equipment shall be installed within a required stairway enclosure.

Exception: Within a required stairway enclosure, electrical raceways may be installed to exclusively serve fire and life safety devices within the stairway enclosure.

FPN: See Seattle Building Code Section 1019.

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.

110.22 Identification of Disconnecting Means. 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.

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 No. 1: See 240.86(B) for interrupting rating marking for end-use equipment.

FPN No. 2: See WAC 296-46B-110 022, Identification of disconnecting means, for clarification of identification requirements.

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

110.26 Spaces About Electrical Equipment. Sufficient access and working space shall be provided and maintained about all electric equipment to permit ready and safe operation and maintenance of such equipment. Enclosures housing electrical apparatus that are controlled by a lock(s) shall be considered accessible to qualified persons.

(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.

Table 110.26(A)(1) Working Spaces

Nominal Voltage to Ground	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
0–150	900 mm (3 ft)	900 mm (3 ft)	900 mm (3 ft)
151–600	900 mm (3 ft)	1.1 m (3½ ft)	1.2 m (4 ft)

Note: Where the conditions are as follows:

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

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

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

(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)(1) unless the requirements of 110.26(A)(1)(a), (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed.

(a) **Dead-Front Assemblies.** Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided.

(b) **Low Voltage.** By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

(c) **Existing Buildings.** In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, 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 electric equipment shall be the width of the equipment or 750 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 Working Space.

(1) Minimum Required. At least one entrance of sufficient area shall be provided to give access to working space about electrical equipment.

(2) Large Equipment. For equipment rated 1200 amperes or more that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to 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. Where the entrance has a personnel door(s), 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.

A single entrance to 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 Exit.** Where the location permits a continuous and unobstructed way of exit 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 so 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.

(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 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 lighting and appliance 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.

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.

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 No. 1 to (2): Receptacles that are not readily accessible.

Exception No. 2 to (2): A single receptacle or a duplex receptacle for two appliances located within dedicated

space for each appliance that, in normal use, is not easily moved from one place to another and that is cord-and-plug connected in accordance with 400.7(A)(6), (A)(7), or (A)(8).

Receptacles installed under the exceptions to 210.8(A)(2) shall not be considered as meeting the requirements of 210.52(G)

- (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.

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

- (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 No. 1 to (5): Receptacles that are not readily accessible.

Exception No. 2 to (5): A single receptacle or a duplex receptacle for two appliances located within dedicated space for each appliance that, in normal use, is not easily moved from one place to another and that is cord-and-plug connected in accordance with 400.7(A)(6), (A)(7), or (A)(8).

Exception No. 3 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.

- (6) Kitchens and Wetbars — 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

(B) Other Than Dwelling Units. All 125-volt, single-phase, 15- and 20-ampere receptacles installed in the locations specified in (1) through ~~((§))~~ (6) shall have ground-fault circuit-interrupter protection for personnel:

- (1) Bathrooms
- (2) Commercial and institutional kitchens — for the purposes of this section, a kitchen is an area with a sink and permanent facilities for food preparation and cooking

~~(3) ((Roof tops)) Countertops and work surfaces where food and beverage preparation occurs~~

~~(4) Wet locations and receptacles that serve wet locations~~

~~(5) Outdoors ((in public spaces for the purpose of this section a public space is defined as any space that is for use by, or is accessible to, the public))~~

Exception to ~~((3) and (4))~~ (5): 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 in accordance with the applicable provisions of Article 426.

~~((5) Outdoors, where installed to comply with 210.63))~~

~~(6) Crawl spaces—at or below grade level~~

(C) Boat Hoists. Ground-fault circuit-interrupter protection for personnel shall be provided for outlets that supply boat hoists installed in dwelling unit locations and supplied by 125-volt, 15- and 20-ampere branch circuits.

210.52 Dwelling Unit Receptacle Outlets. This section provides requirements for 125-volt, 15- and 20-ampere receptacle outlets. Receptacle outlets required by this section shall be in addition to any receptacle that is part of a luminaire (lighting fixture) or appliance, located within cabinets or cupboards, or 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 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 so 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

(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.

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 and dining rooms of dwelling units, receptacle outlets for counter spaces shall be installed in accordance with 210.52(C)(1) through (C)(5).

(1) Wall Counter Spaces. A receptacle outlet shall be installed at each wall counter 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 or sink in the installation described in Figure 210.52.

(2) Island Counter Spaces. At least one receptacle shall be installed at each island counter space with a long dimension of 600 mm (24 in.) or greater and a short dimension of 300 mm (12 in.) or greater. Where a rangetop or sink is installed in an island counter and the width of the counter behind the rangetop or sink is less than 300 mm (12 in.), the rangetop or sink is considered to divide the island into two separate countertop spaces as defined in 210.52(C)(4).

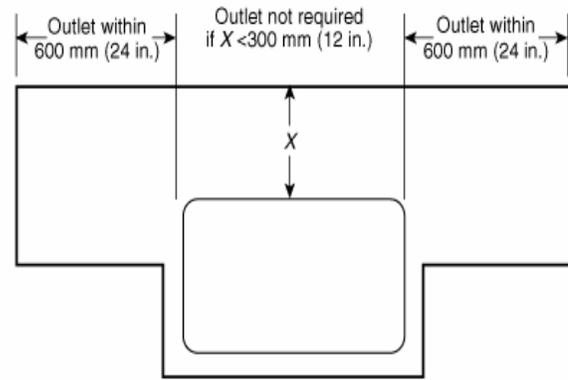
(3) Peninsular Counter Spaces. At least one receptacle outlet shall be installed at each peninsular counter space with a long dimension of 600 mm (24 in.) or greater and a short dimension of 300 mm (12 in.) or greater. A peninsular countertop is measured from the connecting edge.

(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).

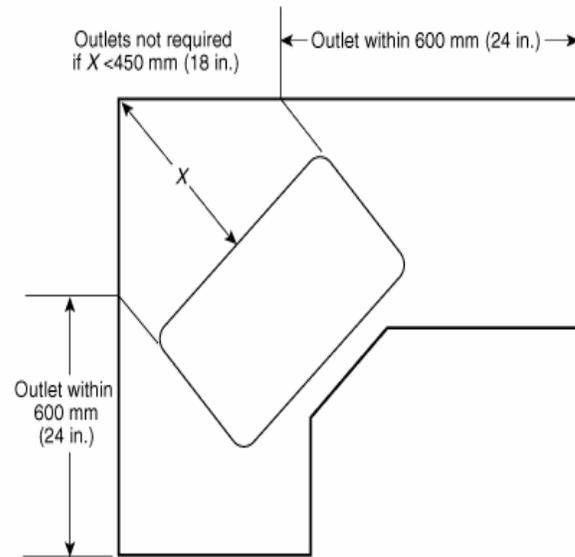
(5) Receptacle Outlet Location. Receptacle outlets shall be located above, but not more than 500 mm (20 in.) above, the countertop. Receptacle outlets rendered not readily accessible by appliances fastened in place, (~~appliance garages,~~) sinks, or rangetops as covered in 210.52(C)(1), ~~Exception(,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



Sink or range extending from face of counter



Sink or range mounted in corner

Figure 210.52 Determination of Area Behind Sink or Range.

(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.

Exception: The receptacle shall not be required to be mounted in the wall or partition where it is installed on the side or face of the basin cabinet not more than 300 mm (12 in.) below the countertop.

(E) Outdoor Outlets. For a one-family dwelling and each unit of a two-family dwelling that is at grade level, at least one receptacle outlet accessible ((⚡)) from grade level

and not more than 2.0 m (6½ ft) above grade shall be installed at the front and back of the dwelling.

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. See 210.8(A)(3).

(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.

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, at least one receptacle outlet, in addition to any provided for laundry equipment, shall be installed in each basement and in each attached garage, and in each detached garage with electric power. See 210.8(A)(2) and (A)(5). 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.

**ARTICLE 215
Feeders**

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

**ARTICLE 220
Branch-Circuit, Feeder, and Service
Calculations**

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 (the 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

Type of Occupancy	Unit Load	
	Volt-Amperes per Square Meter	Volt-Amperes per Square Foot
Armories and auditoriums	11	1
Banks	39 ^b	3½ ^b
Barber shops and beauty parlors	33	3
Churches	11	1
Clubs	22	2
Court rooms	22	2
Dwelling units ^a	33	3
Garages—commercial (storage)	6	½
Hospitals	22	2
Hotels and motels, including apartment houses without provision for cooking by tenants ^a	22	2
Industrial commercial (loft) buildings	22	2
Lodge rooms	17	1½
Office buildings	39 ^b	3½ ^b
Restaurants	22	2
Schools	33	3
Stores	33	3
Warehouses (storage)	3	¼
In any of the preceding occupancies except one-family dwellings and individual dwelling units of two-family and multifamily dwellings:		
Assembly halls and auditoriums	11	1
Halls, corridors, closets, stairways	6	½
Storage spaces	3	¼

^a See 220.14(J).

^b See 220.14(K).

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.

ARTICLE 225
Outside Branch Circuits and Feeders

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: See WAC 296-46B-225 032. Location of outside feeder disconnecting means.

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.

ARTICLE 230
Services

230.1 Scope.

(A) 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.

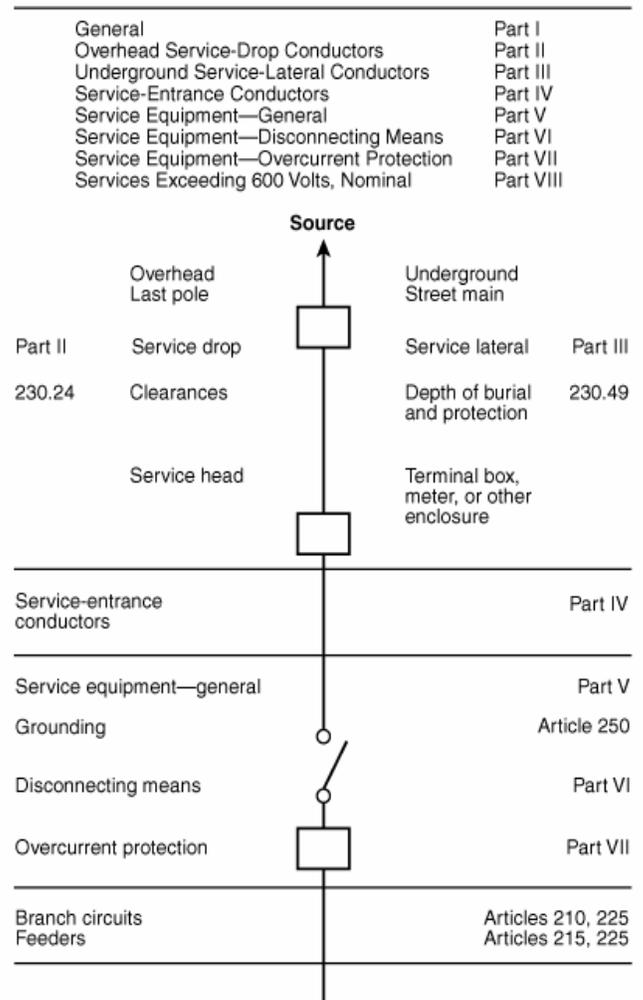


Figure 230.1 Services

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.

(A) 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) 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) 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 eighteen inches 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 eight feet of rigid steel or rigid nonmetallic conduit inside the building.
 - c. A termination or current transformer section of built, sectionalized service equipment that is used exclusively for the connection of the utility distribution system. This section must be fed from underground or concrete encased conduit and the service equipment must 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 2 inches.
- (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 24 inches of the mast.
- (5) Masts over 26 inches 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.
- (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: See WAC 296-46B-230 028 regarding mast supports for feeders and branch circuits.

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.

(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.

(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 15 feet 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.

FPN: Service lateral conductors are utility conductors under the serving utility's jurisdiction.

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:

(A) 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.

(B) 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.

(C) 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 2-inch bushing in the back of such new enclosure, through the void area between enclosures, and continue in the existing conduit to the panel.

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

(E) 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.

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

(G) On existing services, a weatherhead-to-weatherhead connection shall be permitted. The distance between weatherheads shall not exceed 24 inches.

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~~
- ~~(2) Type IGS cable))~~
- (3) Rigid metal conduit
- (4) Intermediate metal conduit
- ~~((5) Electrical metallic tubing~~
- ~~(6) Electrical nonmetallic tubing (ENT)~~
- ~~(7) Service entrance cables~~
- ~~(8) Wireways))~~
- (9) Busways
- ~~((10) Auxiliary gutters))~~
- (11) Rigid nonmetallic conduit
- (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)~~
- ~~(16) Liquidtight flexible nonmetallic conduit))~~

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.

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.

~~((230.52 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) Raintight Service Head. Service raceways shall be equipped with a raintight service head at the point of connection to service-drop conductors.

(B) Service Cable Equipped with Raintight Service Head or Gooseneck. Service cables shall be equipped with a raintight service head.

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.

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 Service Head. Service-entrance conductors shall extend at least 18 inches from the service head to permit connection to the service drop.

FPN: See also WAC 296-46B-230 Drawing E-101, E-102, and E-103.

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).

(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: See also WAC 296-46B-230 070(12)(b).

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

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

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

(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. 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

- (4) Instrument transformers (current and voltage), impedance shunts, load management devices, and arresters
- (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 transient voltage surge suppressors, 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.
- (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

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 conform with 430.52, 430.62, and 430.63 shall be permitted.

Exception No. 2: Fuses and circuit breakers with a rating or setting that conforms 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: See WAC 296-46B-230 042, Service conductor – size and rating, if the service conductors have a lesser ampacity than the overcurrent protection or the equipment rating that they terminate in or on.

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

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.

230.95 Ground-Fault Protection of Equipment.

Ground-fault protection of equipment shall be provided for solidly grounded wye electrical 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 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 No. 1: 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.

Exception No. 2: The ground-fault protection provisions of this section shall not apply to fire pumps.

(A) Setting. The ground-fault protection system shall operate to cause the service disconnect to open all ungrounded conductors of the faulted circuit. The maximum setting of the ground-fault protection shall be 1200 amperes, and the maximum time delay shall be one

second for ground-fault currents equal to or greater than 3000 amperes.

(B) Fuses. If a switch and fuse combination is used, the fuses employed shall be capable of interrupting any current higher than the interrupting capacity of the switch during a time that the ground-fault protective system will not cause the switch to open.

(C) Performance Testing. The ground-fault protection system shall be performance tested when first installed on site. 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. This performance test and subsequent evaluation shall be performed by a firm having qualified personnel and proper equipment. The tested equipment shall be labeled identifying the firm, date of test, and setting.

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.

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 electrical 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 nonmetallic conduit
- (4) Busways
- (5) Cablebus

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

ARTICLE 240
Overcurrent Protection

240.24 Location in or on Premises.

(A) Accessibility. 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 368.12.
- (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.

Exception No. 1: 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 to only authorized management personnel in the following:

- (1) *Multiple-occupancy buildings*
- (2) *Guest rooms or guest suites of hotels and motels that are intended for transient occupancy*

Exception No. 2: 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 shall be permitted to be accessible to only authorized management personnel for guest rooms of hotels and motels that are intended for transient occupancy.

(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.))~~

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

~~((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.)

(E) 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.

ARTICLE 250 Grounding and Bonding

250.32 Buildings or Structures Supplied by Feeder(s) or Branch Circuit(s).

(A) Grounding Electrode. Building(s) or structure(s) supplied by feeder(s) or branch circuit(s) shall have a grounding electrode or grounding electrode system installed in accordance with 250.50. The grounding electrode conductor(s) shall be connected in accordance with 250.32(B) or (C). Where there is no existing grounding electrode, the grounding electrode(s) required in 250.50 shall be installed.

Exception: A grounding electrode shall not be required where only a single branch circuit supplies the building or structure and the branch circuit includes an equipment grounding conductor for grounding the conductive non-current-carrying parts of equipment. For the purpose of this section, a multiwire branch circuit shall be considered as a single branch circuit.

(B) Grounded Systems. For a grounded system at the separate building or structure, the connection to the grounding electrode and grounding or bonding of equipment, structures, or frames required to be grounded or bonded shall comply with ~~((either))~~ 250.32(B)(1) ~~((or (B)(2)))~~.

(1) Equipment Grounding Conductor. An equipment grounding conductor as described in 250.118 shall be run with the supply conductors and connected to the building or structure disconnecting means and to the grounding electrode(s). The equipment grounding conductor shall be used for grounding or bonding of equipment, structures, or frames required to be grounded or bonded. The equipment grounding conductor shall be sized in accordance with 250.122. Any installed grounded conductor shall not be connected to the equipment grounding conductor or to the grounding electrode(s).

~~((2) Grounded Conductor.~~ Where (1) an equipment grounding conductor is not run with the supply to the building or structure, (2) there are no continuous metallic paths bonded to the grounding system in each building or structure involved, and (3) ground fault protection of equipment has not been installed on the supply side of the feeder(s), the grounded conductor run with the supply to the building or structure shall be connected to the building or structure disconnecting means and to the grounding electrode(s) and shall be used for grounding or bonding of equipment, structures, or frames required to be grounded or bonded. The size of the grounded conductor shall not be smaller than the larger of either of the following:

- ~~(1) That required by 220.61~~
- ~~(2) That required by 250.122))~~

FPN: See WAC 296-46B-250 032, Two or more buildings or structures.

(C) Ungrounded Systems. The grounding electrode(s) shall be connected to the building or structure disconnecting means.

(D) Disconnecting Means Located in Separate Building or Structure on the Same Premises. Where one or more disconnecting means supply one or more additional buildings or structures under single management, and where these disconnecting means are located remote from those buildings or structures in accordance with the provisions of 225.32, Exception Nos. 1 and 2, all of the following conditions shall be met:

- (1) The connection of the grounded conductor to the grounding electrode at a separate building or structure shall not be made.
- (2) An equipment grounding conductor for grounding any non-current-carrying equipment, interior metal piping systems, and building or structural metal frames is run with the circuit conductors to a separate building or structure and bonded to existing grounding electrode(s) required in Part III of this article, or, where there are no existing electrodes, the grounding electrode(s) required in Part III of this article shall be installed where a separate building or structure is supplied by more than one branch circuit.
- (3) Bonding the equipment grounding conductor to the grounding electrode at a separate building or structure shall be made in a junction box, panelboard, or similar enclosure located immediately inside or outside the separate building or structure.

(E) Grounding Electrode Conductor. The size of the grounding electrode conductor to the grounding electrode(s) shall not be smaller than given in 250.66,

based on the largest ungrounded supply conductor. The installation shall comply with Part III of this article.

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)(2) through (A)(7). 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. The requirements of this section apply to temporary construction services and supersede the requirements set forth in WAC 296-46B-250.052.

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

250.92 Services.

(A) Bonding of Services. The non-current-carrying metal parts of equipment indicated in 250.92(A)(1), (A)(2), and (A)(3) shall be effectively 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.
- (3) Any metallic raceway or armor enclosing a grounding electrode conductor as specified in 250.64(B). Bonding shall apply at each end and to all intervening raceways, boxes, and enclosures between the service equipment and the grounding electrode.

(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 terminal boxes and current transformer enclosures.
- (2) Connections utilizing threaded couplings or threaded bosses on enclosures where made up wrenchtight
- (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 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.

(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, 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 to 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.

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 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.

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 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.

ARTICLE 300 Wiring Methods

300.1 Scope.

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

(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 Designator and Trade Sizes

Metric Designator	Trade Size
12	3/8
16	1/2
21	3/4
27	1
35	1-1/4
41	1-1/2
53	2
63	2-1/2
78	3
91	3-1/2
103	4
129	5
155	6

Note: The metric designators and trade sizes are for identification purposes only and are not actual dimensions.

FPN: See WAC 296-46B-010 (14), (17), (18) and WAC 296-46B-010 Tables 010-1 and 010-2 for wiring methods for designated building occupancies.

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 from penetration by screws or nails by a steel plate or bushing, 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 (8) requires that wiring and device boxes be at least 2 ½ inches (63 mm) from the exterior surface of framing members.

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

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

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

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

(1) Nonmetallic-Sheathed Cable. In both exposed and concealed locations where nonmetallic-sheathed cables pass through either factory or field punched, cut, or drilled slots or holes in metal members, the cable shall be protected by listed two-piece interlocking bushings or listed two-piece interlocking grommets covering all metal edges that are securely fastened in the opening prior to installation of the cable.

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

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

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

(D) Cables and Raceways Parallel to Framing Members and Furring Strips. In both exposed and concealed locations, where a cable- or raceway-type wiring method is installed parallel to framing members, such as joists, rafters, or studs, or is installed parallel to furring strips, the cable or raceway shall be installed and supported so that the nearest outside surface of the cable or raceway is not less than 32 mm (1¼ in.) from the nearest edge of the framing member or furring strips where nails or screws are likely to penetrate. Where this distance cannot be maintained, the cable or raceway shall be protected from penetration by nails or screws by a steel plate, sleeve, or equivalent at least 1.6 mm (1/16 in.) thick.

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

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

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

(E) Cables 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 (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.

(F) Insulated Fittings. Where raceways containing ungrounded conductors 4 AWG or larger 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.

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: See WAC 296-46B-300 011, Support of raceways, cables, or boxes in suspended ceilings.

(1) Fire-Rated Assemblies. Wiring located within the cavity of a fire-rated floor-ceiling or roof-ceiling assembly shall not be secured to, or supported by, the ceiling assembly, including the ceiling support wires. An independent means of secure support shall be provided and shall be permitted to be attached to the assembly. Where independent support wires are used, they shall be distinguishable by color, tagging, or other effective means from those that are part of the fire-rated design.

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

FPN: One method of determining fire rating is testing in accordance with NFPA 251-1999, Standard Methods of Tests of Fire Endurance 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.

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 nonelectric 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 (fixtures) in accordance with 410.16(F)

(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.

300.17 Number and Size of Conductors in Raceway. The number and size of conductors in any raceway shall not be more than will permit dissipation of the heat and ready installation or withdrawal of the conductors without damage to the conductors or to their insulation.

FPN No. 1: See WAC 296-46B-300 017, Conductors in Raceway.

FPN No. 2: See the following sections of this *Code*: intermediate metal conduit, 342.22; rigid metal conduit, 344.22; flexible metal conduit, 348.22; liquidtight flexible metal conduit, 350.22; rigid nonmetallic conduit, 352.22; liquidtight nonmetallic flexible conduit, 356.22; electrical metallic tubing, 358.22; flexible metallic tubing, 360.22; electrical nonmetallic tubing, 362.22; cellular concrete floor raceways, 372.11; cellular metal floor raceways, 374.5; metal wireways, 376.22; nonmetallic wireways, 378.22; surface metal raceways, 386.22; surface nonmetallic raceways, 388.22; underfloor raceways, 390.5; fixture wire, 402.7; theaters, 520.6; signs, 600.31(C); elevators, 620.33; audio signal processing, amplification, and reproduction equipment, 640.23(A) and 640.24; Class 1, Class 2, and Class 3 circuits, Article 725; fire alarm circuits, Article 760; and optical fiber cables and raceways, Article 770.

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. All out-of-service cable shall be removed from accessible ceiling spaces.

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 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.

ARTICLE 314

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

314.1 Scope. This article covers the installation and use of all boxes and conduit bodies used as outlet, device, junction, or pull boxes, depending on their use, and handhole enclosures. Cast, 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 Section 1207 of the Seattle Building Code and Section R328 of the Seattle Residential Code for location of outlet boxes in sound transmission control assemblies.

314.15 Damp, Wet, or Hazardous (Classified) Locations.

(A) Damp or Wet Locations. In damp or wet locations, boxes, conduit bodies, and fittings shall be placed or equipped so as to prevent moisture from entering or accumulating within the box, conduit body, or fitting.

Boxes, conduit bodies, and fittings installed in wet locations shall be listed for use in wet locations.

FPN No. 1: For boxes in floors, see 314.27(C).

FPN No. 2: For protection against corrosion, see 300.6.

FPN No. 3: See WAC 296-46B-314 001(1), Boxes and fittings.

(B) Hazardous (Classified) Locations. Installations in hazardous (classified) locations shall conform to Articles 500 through 517.

314.23 Supports. Enclosures within the scope of this article shall be supported in accordance with one or more of the provisions in 314.23(A) through (H).

(A) Surface Mounting. An enclosure mounted on a building or other surface shall be rigidly and securely fastened in place. If the surface does not provide rigid and secure support, additional support in accordance with other provisions of this section shall be provided.

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

(1) Nails and Screws. Nails and screws, where used as a fastening means, shall be attached by using brackets on the outside of the enclosure, or they shall pass through the interior within 6 mm (¼ in.) of the back or ends of the enclosure. Screws shall not be permitted to pass through the box unless exposed threads in the box are protected using approved means to avoid abrasion of conductor insulation.

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

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

(D) Suspended Ceilings. An enclosure mounted to structural or supporting elements of a suspended ceiling shall be not more than 1650 cm³ (100 in.³) in size and shall be securely fastened in place in accordance with either (D)(1) or (D)(2).

(1) Framing Members. An enclosure shall be fastened to the framing members by mechanical means such as bolts, screws, or rivets, or by the use of clips or other securing means identified for use with the type of ceiling framing member(s) and enclosure(s) employed. The framing

members shall be adequately supported and securely fastened to each other and to the building structure.

(2) Support Wires. The installation shall comply with the provisions of 300.11(A). The enclosure shall be secured, using methods identified for the purpose, to ceiling support wire(s), including any additional support wire(s) installed for that purpose. Support wire(s) used for enclosure support shall be fastened at each end so as to be taut within the ceiling cavity.

(E) Raceway Supported Enclosure, Without Devices, Luminaires (Fixtures), or Lampholders. An enclosure that does not contain a device(s) other than splicing devices or support a luminaire(s) [fixture(s)], lampholder, or other equipment and is supported by entering raceways shall not exceed 1650 cm³ (100 in.³) in size. It shall have threaded entries or have hubs identified for the purpose. It shall be supported by two or more conduits threaded wrenchtight into the enclosure or hubs. Each conduit shall be secured within 900 mm (3 ft) of the enclosure, or within 450 mm (18 in.) of the enclosure if all conduit entries are on the same side.

Exception: Rigid metal, intermediate metal, or rigid nonmetallic conduit or electrical metallic tubing shall be permitted to support a conduit body of any size, including a conduit body constructed with only one conduit entry, provided the trade size of the conduit body is not larger than the largest trade size of the conduit or electrical metallic tubing.

(F) Raceway Supported Enclosures, with Devices, Luminaires (Fixtures), or Lampholders. An enclosure that contains a device(s), other than splicing devices, or supports a luminaire(s) [fixture(s)], lampholder, or other equipment and is supported by entering raceways shall not exceed 1650 cm³ (100 in.³) in size. It shall have threaded entries or have hubs identified for the purpose. It shall be supported by two or more conduits threaded wrenchtight into the enclosure or hubs. Each conduit shall be secured within 450 mm (18 in.) of the enclosure.

Exception No. 1: Rigid metal or intermediate metal conduit shall be permitted to support a conduit body of any size, including a conduit body constructed with only one conduit entry, provided the trade size of the conduit body is not larger than the largest trade size of the conduit.

Exception No. 2: An unbroken length(s) of rigid or intermediate metal conduit shall be permitted to support a box used for luminaire (fixture) or lampholder support, or to support a wiring enclosure that is an integral part of a luminaire (fixture) and used in lieu of a box in accordance with 300.15(B), where all of the following conditions are met:

(a) The conduit is securely fastened at a point so that the length of conduit beyond the last point of conduit support does not exceed 900 mm (3 ft).

(b) The unbroken conduit length before the last point of conduit support is 300 mm (12 in.) or greater, and that portion of the conduit is securely fastened at some point not less than 300 mm (12 in.) from its last point of support.

(c) Where accessible to unqualified persons, the luminaire (fixture) or lampholder, measured to its lowest point, is at least 2.5 m (8 ft) above grade or standing area and at least 900 mm (3 ft) measured horizontally to the 2.5 m (8 ft) elevation from windows, doors, porches, fire escapes, or similar locations.

(d) A luminaire (fixture) supported by a single conduit does not exceed 300 mm (12 in.) in any direction from the point of conduit entry.

(e) The weight supported by any single conduit does not exceed 9 kg (20 lb).

(f) At the luminaire (fixture) or lampholder end, the conduit(s) is threaded wrenchtight into the box, conduit body, or integral wiring enclosure, or into hubs identified for the purpose. Where a box or conduit body is used for support, the luminaire (fixture) shall be secured directly to the box or conduit body, or through a threaded conduit nipple not over 75 mm (3 in.) long.

(G) Enclosures in Concrete or Masonry. An enclosure supported by embedment shall be identified as suitably protected from corrosion and securely embedded in concrete or masonry.

(H) Pendant Boxes. An enclosure supported by a pendant shall comply with 314.23(H)(1) or (H)(2).

(1) Flexible Cord. A box shall be supported from a multiconductor cord or cable in an approved manner that protects the conductors against strain, such as a strain-relief connector threaded into a box with a hub.

FPN: See WAC 296-46B-314 023(H) Flexible cord connection of pendant boxes.

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

Where supported by only a single conduit, the threaded joints shall be prevented from loosening by the use of set-screws or other effective means, or the

luminaire (fixture), at any point, shall be at least 2.5 m (8 ft) above grade or standing area and at least 900 mm (3 ft) measured horizontally to the 2.5 m (8 ft) elevation from windows, doors, porches, fire escapes, or similar locations. A luminaire (fixture) supported by a single conduit shall not exceed 300 mm (12 in.) in any horizontal direction from the point of conduit entry.

314.29 Boxes, Conduit Bodies, and Handhole Enclosures to Be Accessible. Boxes, conduit bodies, and handhole enclosures shall be installed so that the wiring contained in them can be rendered accessible without removing any part of the building or, in underground circuits, without excavating sidewalks, paving, earth, or other substance that is to be used to establish the finished grade. Conduit bodies, junction, pull and outlet boxes shall be installed so that the wiring contained in them can be located without removing any part of the building structure, including insulation material.

Exception: Listed boxes and handhole enclosures shall be permitted where covered by gravel, light aggregate, or noncohesive granulated soil if their location is effectively identified and accessible for excavation.

ARTICLE 326
Integrated Gas Spacer Cable: Type IGS

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))~~
- (2) Feeder or branch-circuit conductors

ARTICLE 330
Metal-Clad Cable: Type MC

330.10 Uses Permitted.

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

- (1) For ~~((services))~~ branch circuits, feeders, and ((branch-circuits)) services with prior approval of the authority having jurisdiction when installed in compliance with Section 330.10(11).
- (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.
- (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.

(B) Specific Uses. Type MC cable shall be permitted to be installed in compliance with Parts II and III of Article 725 and 770.52 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 as Aerial Cable. Type MC cable installed outside of buildings or as aerial cable shall comply with 225.10, 396.10, and 396.12.

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

ARTICLE 334
Nonmetallic-Sheathed Cable: Types NM, NMC, and NMS

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

- (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 220-1999, *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:

- (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.))

(A) Work Considered as Concealed. Nonmetallic-sheathed cable shall be considered as concealed where installed in inaccessible void areas of buildings or where run between or through bored holes of studs, joists and similar members as required in Section 300.4. All outlet,

junction or device boxes shall be installed as required for concealed work.

(B) Protection from Physical Damage. Cable shall be protected from physical damage where necessary by rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC rigid nonmetallic conduit, or other approved means. ~~((Where passing through a floor, the cable shall be enclosed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC rigid nonmetallic conduit, or other approved means extending at least 150 mm (6 in.) above the floor.))~~

Where Type NMC cable is installed in shallow chases in masonry, concrete, or adobe, the cable shall be 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.

► Exception No. 1: Nonmetallic-sheathed cable may be installed in the attic space of buildings, provided it is protected from physical damage by the use of running boards, conduit, guard strips or other approved means as required in Section 334.23

Exception No. 2: Exposed nonmetallic-sheathed cable that is properly supported may enter the top section only of a surface-mounted main service panel where the distance from the top of the panel to the bottom of the ceiling joist above does not exceed 2-1/2 feet.

~~((C) In Unfinished Basements.~~ Where cable is run at angles with joists in unfinished basements, 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 used on a wall of an unfinished basement shall be permitted to be installed in a listed conduit or tubing. Conduit or tubing shall utilize a nonmetallic bushing or adapter at the point the cable enters the raceway. Metal conduit and tubings and metal outlet boxes shall be grounded.))

(C) Unexcavated Spaces. Type NM cable installed in compliance with the requirements of this section may be used in unexcavated spaces under dwellings provided that all outlet and junction boxes are installed in accessible locations.

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.))~~

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

ARTICLE 338

Service-Entrance Cable: Types SE and USE

338.10 Uses Permitted.

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

~~Type USE used for service laterals shall be permitted to emerge from the ground outside at terminations in meter bases or other enclosures where protected in accordance with 300.5(D).))~~

(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 rubber-covered 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 250.140, 250.32, and 225.30 through 225.40.

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

(4) Installation Methods for Branch Circuits and Feeders.

(a) *Interior Installations.* In addition to the provisions of this article, Type SE service-entrance cable used for interior wiring shall comply with the installation requirements of Parts I and II of Article 334, excluding 334.80.

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, unless used as messenger-supported wiring as permitted in Part II of Article 396. Type USE cable installed as underground feeder and branch circuit cable shall comply with Part II of Article 340. Where Type USE cable emerges from the ground at terminations, it shall be protected in accordance with 300.5(D). Multiconductor service-entrance cable shall be permitted to be installed as messenger-supported wiring in accordance with 225.10 and Part II of Article 396.

ARTICLE 358

Electrical Metallic Tubing: Type EMT

358.10 Uses Permitted.

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

(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.

(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.

ARTICLE 382

Nonmetallic Extensions

Article 382 is not adopted.

ARTICLE 394

Concealed Knob-and-Tube Wiring

394.12 Uses Not Permitted. Concealed knob-and-tube wiring shall not be used in the following:

- (1) Commercial garages
- (2) Theaters and similar locations
- (3) Motion picture studios
- (4) Hazardous (classified) locations
- (5) Hollow spaces of walls, ceilings, and attics where such spaces are insulated by loose, rolled, or foamed-in-place insulating material that envelops the conductors

FPN: See WAC 296-46B-394 001, Knob and Tube Wiring, for insulating voids in spaces containing existing knob and tube wiring.

ARTICLE 404 Switches

404.3 Enclosure.

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

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

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

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

404.10 Mounting of Snap Switches.

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

(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 404.13(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.

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.

ARTICLE 410 Luminaires (Lighting Fixtures), Lampholders, and Lamps

410.4 Luminaires (Fixtures) in Specific Locations.

(A) Wet and Damp Locations. Luminaires (fixtures) installed in wet or damp locations shall be installed so that water cannot enter or accumulate in wiring compartments, lampholders, or other electrical parts. All luminaires (fixtures) installed in wet locations shall be marked, "Suitable for Wet Locations." All luminaires (fixtures) installed in damp locations shall be marked, "Suitable for Wet Locations" or "Suitable for Damp Locations."

(B) Corrosive Locations. Luminaires (fixtures) installed in corrosive locations shall be of a type suitable for such locations.

(C) In Ducts or Hoods. Luminaires (fixtures) shall be permitted to be installed in commercial cooking hoods where all of the following conditions are met:

- (1) The luminaire (fixture) shall be identified for use within commercial cooking hoods and installed such that the temperature limits of the materials used are not exceeded.
- (2) The luminaire (fixture) shall be constructed so that all exhaust vapors, grease, oil, or cooking vapors are excluded from the lamp and wiring compartment. Diffusers shall be resistant to thermal shock.
- (3) Parts of the luminaire (fixture) exposed within the hood shall be corrosion resistant or protected against corrosion, and the surface shall be smooth so as not to collect deposits and to facilitate cleaning.
- (4) Wiring methods and materials supplying the luminaire(s) [fixture(s)] shall not be exposed within the cooking hood.

FPN: See 110.11 for conductors and equipment exposed to deteriorating agents.

(D) Bathtub and Shower Areas. No parts of cord-connected luminaires (fixtures), chain-, cable-, or cord-suspended-luminaires (fixtures), lighting track, pendants,

or ceiling-suspended (paddle) fans shall be located within a zone measured 900 mm (3 ft) horizontally and 2.5 m (8 ft) vertically from the top of the bathtub rim or shower stall threshold. This zone is all encompassing and includes the zone directly over the tub or shower stall. Luminaires (lighting fixtures) located in this zone shall be listed for damp locations, or listed for wet locations where subject to shower spray.

FPN: See WAC 296-46B-410 (004) (1) Equipment for general use-Luminaires. The rule is intended to apply to locations within the shower enclosure or within five feet vertically from the water line of the tub.

(E) Luminaires (Fixtures) in Indoor Sports, Mixed-Use, and All-Purpose Facilities. Luminaires (fixtures) subject to physical damage, using a mercury vapor or metal halide lamp, installed in playing and spectator seating areas of indoor sports, mixed-use, or all-purpose facilities shall be of the type that protects the lamp with a glass or plastic lens. Such luminaires (fixtures) shall be permitted to have an additional guard.

410.30 Cord-Connected Lampholders and Luminaires (Fixtures).

(A) Lampholders. Where a metal lampholder is attached to a flexible cord, the inlet shall be equipped with an insulating bushing that, if threaded, is not smaller than metric designator 12 (trade size 3/8) pipe size. The cord hole shall be of a size appropriate for the cord, and all burrs and fins shall be removed in order to provide a smooth bearing surface for the cord.

Bushing having holes 7 mm (9/32 in.) in diameter shall be permitted for use with plain pendant cord and holes 11 mm (13/32 in.) in diameter with reinforced cord.

(B) Adjustable Luminaires (Fixtures). Luminaires (fixtures) that require adjusting or aiming after installation shall not be required to be equipped with an attachment plug or cord connector, provided the exposed cord is of the hard-usage or extra-hard-usage type and is not longer than that required for maximum adjustment. The cord shall not be subject to strain or physical damage.

(C) Electric-Discharge Luminaires (Fixtures).

(1) Cord Connected Installation. A listed luminaire (fixture) or a listed assembly shall be permitted to be cord connected if the following conditions apply:

- (1) The luminaire (fixture) is located directly below the outlet or busway.
- (2) The flexible cord meets all the following:
 - a. Is visible for its entire length outside the luminaire (fixture)
 - b. Is not subject to strain or physical damage

- c. Is terminated in a grounding-type attachment plug cap or busway plug, or is a part of a listed assembly incorporating a manufactured wiring system connector in accordance with 604.6(C), or has a luminaire (fixture) assembly with a strain relief and canopy

FPN: See WAC 296-46B 410 030 Flexible cord connection of electric discharge luminaires.

(2) Provided with Mogul-Base, Screw-Shell Lampholders. Electric-discharge luminaires (lighting fixtures) provided with mogul-base, screw-shell lampholders shall be permitted to be connected to branch circuits of 50 amperes or less by cords complying with 240.5. Receptacles and attachment plugs shall be permitted to be of a lower ampere rating than the branch circuit but not less than 125 percent of the luminaire (fixture) full-load current.

(3) Equipped with Flanged Surface Inlet. Electric-discharge luminaires (lighting fixtures) equipped with a flanged surface inlet shall be permitted to be supplied by cord pendants equipped with cord connectors. Inlets and connectors shall be permitted to be of a lower ampere rating than the branch circuit but not less than 125 percent of the luminaire (fixture) load current.

**ARTICLE 450
Transformers and Transformer Vaults
(Including Secondary Ties)**

450.19 Location and Construction.

(A) Location of Pad-Mounted Transformers. See WAC 296-46B-450 027 (1) and Figures 450-1 and 450-2.

(B) Total Underground Transformers. See WAC 296-46B-450 027 (2), except that enclosures for total underground transformers shall not be located within 10 feet of a doorway or fire escape.

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

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 the NEC.

III. Transformer Vaults

Sections 450.41 through 450.48 are not adopted. See Seattle Building Code for requirements for transformer vaults.

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 situations, the service equipment may be located in or on the building by special permission.

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.

ARTICLE 620 Elevators, Dumbwaiters, Escalators, Moving Walks, Wheelchair Lifts, and Stairway Chair Lifts

620.5 Working Clearances. Working space shall be provided about controllers, disconnecting means, and other electrical equipment. The minimum working space shall not be less than that specified in ~~((110.26(A)))~~ Seattle Building Code Section 3020.4.

The clear working space in front of a disconnecting means shall be not less than 1220 mm (48 inches) in depth and 760 mm (30 inches) in width.

Elevator machine rooms are required to have not less than 7 feet 0 inches of headroom, per ASME A17.1, Rule 101.4.

~~((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 620.5(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, wheelchair lifts, and stairway chairlifts installed in the same space with the driving machine~~
- ~~(2) Controllers and disconnecting means for elevators installed in the hoistway or on the car~~
- ~~(3) Controllers for door operators~~
- ~~(4) Other electrical equipment installed in the hoistway or on the car~~

~~(B) Guards.~~ Live parts of the electrical equipment are suitably guarded, isolated, or insulated, 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.)

620.21 Wiring Methods. Conductors and optical fibers located in hoistways, in escalator and moving walk wellways, in wheelchair lifts, stairway chairlift runways, machinery spaces, control spaces, in or on cars, in machine rooms and control rooms, not including the traveling cables connecting the car or counterweight and hoistway wiring, shall be installed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, rigid nonmetallic conduit, or wireways, ~~((or shall be Type MC, MI, or AC cable))~~ unless otherwise ~~((permitted))~~ specified in 620.21(A) through 620.21(C).

Type MC cable or Type MI cable may be permitted to be installed in elevator spaces only by special permission.

(A) Elevators.

(1) Hoistways.

~~(a) Nonmetallic raceways and wireways shall not be installed in hoistways required to be of noncombustible fire resistive construction.~~ Flexible metal conduit, 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) Nonmetallic raceways and wireways shall not be installed in hoistways required to be of noncombustible fire resistive construction.~~ 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) Nonmetallic raceways and wireways shall not be installed in hoistways required to be of noncombustible fire resistive construction. Flexible metal conduit, liquidtight flexible metal conduit, liquidtight flexible nonmetallic conduit or flexible cords and cables, or conductors grouped together and taped or corded that are part of listed equipment, a driving machine, or a driving machine brake shall be permitted in the hoistway, in lengths not to exceed 1.8 m (6 ft), without being installed in a raceway and where located to be protected from physical damage and are of a flame-retardant type.

(2) Cars.

(a) Nonmetallic raceways and wireways shall not be installed on cars located in hoistways required to be of noncombustible fire resistive construction. Flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit of metric designator 12 (trade size 3/8), or larger, not exceeding ~~((1.8 m (6 ft)))~~ 915 mm (3 ft) in length, shall be permitted on cars where so located as to be free from oil and if securely fastened in place. Flexible conduit shall not be located where it can be walked on or damaged.

((Exception: ~~Liquidtight flexible nonmetallic conduit of metric designator 12 (trade size 3/8), or larger, as defined by 356.2(2), shall be permitted in lengths in excess of 1.8 m (6 ft).~~)

(b) Hard-service cords and junior hard-service cords that conform to the requirements of Article 400 (Table 400.4) shall be permitted as flexible connections between the fixed wiring on the car and devices on the car doors or gates. Hard-service cords only shall be permitted as flexible connections for the portable-type top-of-car operating device or the car-top work lights. Devices or luminaires (fixtures) shall be grounded by means of an equipment grounding conductor run with the circuit conductors. Cables with smaller conductors and other types and thicknesses of insulation and jackets shall be permitted as flexible connections between the fixed wiring on the car and devices on the car doors or gates, if listed for this use.

~~(c) ((Flexible cords and cables that are components of listed equipment and used in circuits operating at 30 volts rms or less or 42 volts dc or less shall be permitted 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) Flexible metal conduit, liquidtight flexible metal conduit, liquidtight flexible nonmetallic conduit or flexible cords and cables, or conductors grouped together and taped or corded that are part of listed equipment, a driving machine, or a driving machine brake shall be permitted on the car assembly, in lengths not to exceed ~~((1.8 m (6 ft)))~~ 915 mm (3 ft) without being installed in a

raceway and where located to be protected from physical damage and are of a flame-retardant type.

(3) Within Machine Rooms, Control Rooms, and Machinery Spaces and Control Spaces.

(a) Flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit of metric designator 12 (trade size 3/8), or larger, not exceeding 1.8 m (6 ft) in length, shall be permitted between control panels and machine motors, machine brakes, motor-generator sets, disconnecting means, and pumping unit motors and valves.

((Exception: ~~Liquidtight flexible nonmetallic conduit metric designator 12 (trade size 3/8) or larger, as defined in 356.2(2), shall be permitted to be installed in lengths in excess of 1.8 m (6 ft).~~)

(b) Where motor-generators, machine motors, or pumping unit motors and valves are located adjacent to or underneath control equipment and are provided with extra-length terminal leads not exceeding 1.8 m (6 ft) in length, such leads shall be permitted to be extended to connect directly to controller terminal studs without regard to the carrying-capacity requirements of Articles 430 and 445. Auxiliary gutters shall be permitted in machine and control rooms between controllers, starters, and similar apparatus.

~~(c) ((Flexible cords and cables that are components of listed equipment and used in circuits operating at 30 volts rms or less or 42 volts dc or less shall be permitted 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.

(4) Counterweight. Nonmetallic raceways and wireways shall not be installed on counterweights installed in hoistways required to be of noncombustible fire resistive construction. Flexible metal conduit, liquidtight flexible metal conduit, liquidtight flexible nonmetallic conduit or flexible cords and cables, or conductors grouped together and taped or corded that are part of listed equipment, a driving machine, or a driving machine brake shall be permitted on the counterweight assembly, in lengths not to exceed 1.8 m (6 ft) without being installed in a raceway and where located to be protected from physical damage and are of a flame-retardant type.

(B) Escalators.

(1) Wiring Methods. Flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic

conduit shall be permitted in escalator and moving walk wellways. Flexible metal conduit or liquidtight flexible conduit of metric designator 12 (trade size 3/8) shall be permitted in lengths not in excess of 1.8 m (6 ft).

Exception: Metric designator 12 (trade size 3/8), nominal, or larger liquidtight flexible nonmetallic conduit, as defined in 356.2(2), shall be permitted to be installed in lengths in excess of 1.8 m (6 ft).

~~(2) **Class 2 Circuit Cables.** Cables used in Class 2 power limited circuits shall be permitted to be installed within escalators and moving walkways, provided the cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.)~~

(3) Flexible Cords. Hard-service cords that conform to the requirements of Article 400 (Table 400.4) shall be permitted as flexible connections on escalators and moving walk control panels and disconnecting means where the entire control panel and disconnecting means are arranged for removal from machine spaces as permitted in 620.5.

(C) Wheelchair Lifts and Stairway Chairlift Raceways.

(1) Wiring Methods. Flexible metal conduit or liquidtight flexible metal conduit shall be permitted in wheelchair lifts and stairway chairlift runways and machinery spaces. Flexible metal conduit or liquidtight flexible conduit of metric designator 12 (trade size 3/8) shall be permitted in lengths not in excess of 1.8 m (6 ft).

Exception: Metric designator 12 (trade size 3/8) or larger liquidtight flexible nonmetallic conduit, as defined in 356.2(2), shall be permitted to be installed in lengths in excess of 1.8 m (6 ft).

~~(2) **Class 2 Circuit Cables.** ((Cables)) Traveling cables used in Class 2 power-limited circuits shall be permitted to be installed within wheelchair lifts and stairway chairlift runways and machinery spaces, provided the cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.~~

► **620.44 Installation of Traveling Cables.** Traveling cable shall be permitted to be run without the use of a raceway 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.

Traveling cables shall be permitted to be continued as fixed wiring to elevator controller enclosures and to elevator car and machine room, control room, machinery space, and control space connections, ~~((provided they are suitably supported and protected from physical damage))~~ and shall be installed in conduits or raceways.

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 disconnecting means shall be a listed device.

FPN: For additional information, see ASME/ANSI A17.1-2000, *Safety Code for Elevators and Escalators*.

Exception: Where an individual branch circuit supplies a wheelchair 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.

(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. 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.

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 Wheelchair Lifts and Stairway Chairlifts. On wheelchair 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.

620.71 Guarding 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 620.71(B). The room or space shall be secured against unauthorized access.

Non-elevator equipment, wiring, pipes, etc., 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 Section 3022 of the Seattle Building Code.

Elevator motor controllers and driving machines may be permitted inside the hoistway by special permission.

(A) Motor Controllers. Motor controllers shall be permitted outside the spaces herein specified, provided they are in enclosures with doors or removable panels that are capable of being locked in the closed position and the disconnecting means is located adjacent to or is an integral part of the motor controller. Motor controller enclosures for escalator or moving walks shall be permitted in the balustrade on the side located away from the moving steps or moving treadway. If the disconnecting means is an integral part of the motor controller, it shall be operable without opening the enclosure.

(B) Driving Machines. Elevators with driving machines located on the car, on the counterweight, or in the hoistway, and driving machines for dumbwaiters, wheelchair lifts, and stairway lifts shall be permitted outside the spaces herein specified.

ARTICLE 680 Swimming Pools, Fountains, and Similar Installations

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: See also WAC 296-46B-680, *Special Equipment – Swimming pools, fountains and similar installations*, for additional requirements.

ARTICLE 700 Emergency Systems

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.

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 99-2002, *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®-2003, *Life Safety Code*®.

FPN No. 5: For further information regarding performance of emergency and standby power systems, see NFPA 110-2002, *Standard for Emergency and Standby Power Systems*.

FPN No. 6: See Seattle Building Code Sections 1006 and 1011 for means of egress illumination and identification requirements.

FPN No. 7: See DPD Client Assistance Memo for additional requirements for emergency and legally-required standby systems.

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 and/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 and/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.

FPN: For testing and maintenance procedures of emergency power supply systems (EPSSs), see NFPA 110-2002, *Standard for Emergency and Standby Power Systems*.

700.9 Wiring, Emergency System.

(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.

FPN: See WAC 296-46B-700 009 (4) for device and junction box identification requirements.

(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 (4):

- (1) Wiring from the normal power source located in transfer equipment enclosures
- (2) Wiring supplied from two sources in exit or emergency luminaires (lighting fixtures)
- (3) Wiring from two sources in a common junction box, attached to exit or emergency luminaires (lighting fixtures)
- (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

(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) 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.

(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
- (2) Be a listed electrical circuit protective system with a minimum 1-hour fire rating
- (3) Be protected by a listed thermal barrier system for electrical system components
- (4) Be protected by a fire-rated assembly listed to achieve a minimum fire rating of 1 hour
- (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.

FPN: For the definition of *occupancy classification*, see ((~~Section 6.1 of NFPA 101 2003, Life Safety Code~~) the Seattle Building Code).

700.12 General Requirements. Current supply shall be such that, in the event of failure of the normal supply to, or within, the building or group of buildings concerned, emergency lighting, emergency power, or both shall be available within the time required for the application but not to exceed 10 seconds. The supply system for emergency purposes, in addition to the normal services to the building and meeting the general requirements of this section, shall be one or more of the types of systems described in 700.12(A) through 700.12(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 700.12(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 2003, Life Safety Code~~) 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.

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.

(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.

(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 700.12(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 acceptable to 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.

(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 (illumination fixtures) that obtain power from a unit equipment and are not part of the unit equipment shall be wired to the unit equipment as required by 700.9 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.

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 light bulb, 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.

Exit signs with open bottom lighting shall not be used in lieu of a required pathway light unless specifically approved for the purpose.

Exit illumination (pathway lighting) and emergency area lighting shall comply with Chapter 10 of the Seattle Building Code.

Exception: Alternative means that ensure emergency lighting illumination level is maintained shall be permitted when pre-approved by the authority having jurisdiction.

ARTICLE 701

Legally Required Standby Systems

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 Section 909.22 of the Seattle Building Code, and
- (2) Elevators serving as an accessible means of egress according to Section 1007.4 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.

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 701.11(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.

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-premise 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 municipal water supply for their cooling systems. Means shall be provided for automatically transferring one fuel supply to another where dual fuel supplies are used.

~~((Exception: Where acceptable to the authority having jurisdiction, the use of other than on site fuels shall be permitted where there is a low probability of a simultaneous failure of both the off site fuel delivery system and power from the outside electrical utility company.))~~

(4) Battery Power. Where a storage battery is used for control or signal power or as the means of starting the prime mover, it shall be suitable for the purpose and shall be equipped with an automatic charging means independent of the generator set.

(5) Outdoor Generator Sets. Where an outdoor housed generator set is equipped with a readily accessible disconnecting means 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.

(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 701.11(B).

(D) Separate Service. Where acceptable to the authority having jurisdiction as a source of power, an additional service shall be permitted. 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
- (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 900 mm (3 ft) in length. The branch circuit feeding the unit equipment shall be the same branch circuit as that serving the normal lighting in the area and connected ahead of any local switches. Legally required standby luminaires (illumination fixtures) 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.

ARTICLE 760 Fire Alarm Systems

760.10 Fire Alarm Circuit Identification. Fire alarm circuits shall be identified at terminal and junction locations in a manner that will prevent unintentional interference with the signaling circuit during testing and servicing.

FPN: See WAC 296-46B-760 for device and junction box identification requirements.

Annex H Seattle Building Code Provisions

SECTION 1006 MEANS OF EGRESS ILLUMINATION

1006.1 Illumination required. The means of egress, including the exit discharge, shall be illuminated at all times the building space served by the means of egress is occupied.

Exceptions:

1. Occupancies in Group U.
2. Aisle accessways in Group A.
3. Dwelling units and sleeping units in Groups R-1, R-2 and R-3.
4. Sleeping units of Group I occupancies.

1006.2 Illumination locations ((level)). ~~illumination shall be provided at every point in ((F))the means of egress. ((illumination level shall not be less than 1 foot candle (11 lux) at the floor level))~~ Luminaires shall be installed whenever exit signs are required as specified in Section 1011.

Exception: For auditoriums, theaters, concert or opera halls and similar assembly occupancies, the illumination at the floor level is permitted to be reduced during performances to not less than 0.2 foot-candle (2.15 lux) provided that the required illumination is automatically restored upon activation of a premise's fire alarm system where such system is provided.

Code Alternate CA1006.2: Compliance with the following paragraphs will be deemed to satisfy the requirement for means of egress illumination at every point in the means of egress. Means of egress illumination systems that comply with this Code Alternate shall also comply with Sections 1006.3 and 1006.4.

1. Location and Fixture Placement. Means of egress illumination shall be located in stairways, corridors, halls, passenger elevator cars, lobbies, rooms with an occupant load of 100 or more, and other areas required to provide safe egress from the premises and immediately outside of the building exit when required by the building official. Fixtures shall be installed to not less than the following schedule:

- | | |
|--|---|
| <u>1.1 Interior and exterior stairways and landings and outside building exit</u> | <u>At least one per landing</u> |
| <u>1.2 Corridors and halls and designated means of egress paths in parking garages</u> | <u>At least one for each 40 lineal feet</u> |
| <u>1.3 Lobbies, vestibules, foyers, elevator cars and</u> | <u>At least one for each 250 sq. ft.</u> |

other similar areas as required

1.4 Warehouses See Item 2 below.

These fixtures may be included in the watts per square foot calculation for means of egress illumination.

2. Amount of Illumination. Where means of egress illumination is required, illumination shall be provided at the rate of 0.1 watt of fluorescent illumination per square foot of area. Installations using incandescent lamps shall have a minimum wattage of at least 3 times the fluorescent requirements. Use of other light sources shall be subject to the approval of the building official.

EXCEPTIONS:

1. In warehouses, the allowable minimum illumination may be 0.1 watt per square foot (0.03 watts for fluorescent) provided fixtures are placed either:
 - 1.1 Where means of egress pathways are not designated, fixtures shall be placed to cover an area not larger than 1,600 square feet, or
 - 1.2 Where means of egress pathways are designated, fixtures shall be placed at least one for every 40 lineal feet.
2. In theaters, auditoriums or other places of assembly where motion pictures or other projections are made by means of directed light, the minimum allowable illumination may be reduced to 0.05 watts per square foot of floor area (0.02 watts for fluorescent). The higher level of required illumination shall be automatically restored upon activation of a premise's fire alarm system where such system is provided.
3. In Groups B, F-1, M and S-1 Occupancies, when approved by the building official, the minimum allowable illumination may be reduced to 0.05 watts per square foot (0.02 watts for fluorescent) of floor area.
4. In Group B Occupancies and open parking garages, when approved by the building official, the illumination may be eliminated when within 50 feet of a window wall or open side and where light is not totally obscured.

Means of egress illumination fixtures shall be spaced and designed to give adequate distribution of light for safe egress and so that the failure of any individual lighting element, such as the burning out of a light bulb, will not leave any space in total darkness.

Illumination from battery operated fixtures shall provide the same level of illumination required for hard-wired fixtures.

1006.3 (~~(Illumination emergency power.)~~) **Power supply.** The power supply for means of egress illumination shall normally be provided by the premise's electrical supply.

In the event of power supply failure, an emergency electrical system shall automatically illuminate the following areas:

1. Exit access corridors, passageways and aisles in rooms and spaces which require two or more means of egress.
2. Exit access corridors and exit stairways located in buildings required to have two or more exits.
3. Exterior egress components at other than the level of exit discharge until exit discharge is accomplished for buildings required to have two or more exits.
4. Interior exit discharge elements, as permitted in Section 1023.1, in buildings required to have two or more exits.

5. The portion of the exterior exit discharge immediately adjacent to exit discharge doorways in buildings required to have two or more exits.

The emergency power system shall provide power for a duration of not less than 90 minutes and shall consist of storage batteries, unit equipment or an on-site generator. The installation of the emergency power system shall be in accordance with Section 2702.

1006.4 (~~(Performance of system.)~~) **Illumination levels.**

1006.4.1 Normal power. When under normal power, the illumination level shall be not less than one foot-candle at floor level at every point in the means of egress.

1006.4.2 Emergency power. Emergency lighting facilities shall be arranged to provide initial illumination that is at least an average of 1 foot-candle (11 lux) and a minimum at any point of 0.1 foot-candle (1 lux) measured along the path of egress at floor level. Illumination levels shall be permitted to decline to 0.6 foot-candle (6 lux) average and a minimum at any point of 0.06 foot-candle (0.6 lux) at the end of the emergency lighting time duration. A maximum-to-minimum illumination uniformity ratio of 40 to 1 shall not be exceeded.

SECTION 1011

EXIT SIGNS

1011.1 Where required. Exits and exit access doors shall be marked by an approved exit sign readily visible from any direction of egress travel. Access to exits shall be marked by readily visible exit signs in cases where the exit or the path of egress travel is not immediately visible to the occupants. Exit sign placement shall be such that no point in an exit access corridor is more than 100 feet (30 480 mm) or the listed viewing distance for the sign, whichever is less, from the nearest visible exit sign. Either exit signs or exit placards shall be located at any other location determined by the building official to be necessary to clearly indicate the direction of egress.

Exceptions:

1. Exit signs are not required in rooms or areas which require only one exit or exit access other than in buildings designed with a single exit stairway according to Section 1018.3 exception 4.
2. Main exterior exit doors or gates which obviously and clearly are identifiable as exits need not have exit signs where approved by the building official.
3. Exit signs are not required in occupancies in Group U and individual sleeping units or dwelling units in Group R-1, R-2 or R-3.
4. Exit signs are not required in sleeping areas in occupancies in Group I-3.
5. In occupancies in Groups A-4 and A-5, exit signs are not required on the seating side of vomitories or openings into seating areas where exit signs are provided in the concourse that are readily apparent from the vomitories. Egress lighting is provided to identify each vomitory or opening within the seating area in an emergency.
6. Exit signs are not required within individual tenant spaces of Group B offices.
7. Exit signs shall not be required on exterior stairways serving exterior exit balconies.

Interpretation I1011.1: Exit placards may be used to identify exits in occupancies where exit signs are not required.

1011.2 Illumination. Exit signs shall be internally or externally illuminated at all times.

Exception: Tactile signs required by Section 1011.3 need not be provided with illumination.

1011.3 Tactile exit signs. A tactile sign stating EXIT and complying with ICC A117.1 shall be provided adjacent to each door to an egress stairway, an exit passageway and the exit discharge.

1011.4 (~~Internally illuminated~~) Listing of exit signs. (~~Internally illuminated~~) All exit signs shall be listed and

labeled and shall be installed in accordance with the manufacturer's instructions and Section 2702. Exit signs shall be illuminated at all times.

1011.5 Externally illuminated exit signs. Externally illuminated exit signs shall comply with Sections 1011.5.1 through 1011.5.3.

1011.5.1 Graphics. Every exit sign, exit placard and directional exit sign shall have plainly legible green letters not less than 6 inches (152 mm) high with the principal strokes of the letters not less than 0.75 inch (19.1 mm) wide. The word "EXIT" shall have letters having a width not less than 2 inches (51 mm) wide except the letter "I," and the minimum spacing between letters shall not be less than 0.375 inch (9.5 mm). Signs and placards larger than the minimum established in this section shall have letter widths, strokes and spacing in proportion to their height.

The word "EXIT" shall be in high contrast with the background and shall be clearly discernible when the exit sign illumination means is or is not energized. If an arrow is provided as part of the exit sign or placard, the construction shall be such that the arrow direction cannot be readily changed.

EXCEPTION: Existing exit signs or placards with letters at least 5 inches (127 mm) in height may be reused.

~~(1011.5.2 Exit sign illumination. The face of an exit sign illuminated from an external source shall have an intensity of not less than 5 foot candles (54 lux).)~~

1011.5.3 Power source. Exit signs shall be illuminated at all times. To ensure continued illumination for a duration of not less than 90 minutes in case of primary power loss, the sign illumination means shall be connected to an emergency power system provided from storage batteries, unit equipment or an on-site generator. The installation of the emergency power system shall be in accordance with Section 2702.

Exception: Approved exit sign illumination means that provide continuous illumination independent of external power sources for a duration of not less than 90 minutes, in case of primary power loss, are not required to be connected to an emergency electrical system.

1011.5.4 Not-an-Exit Warnings. Placards reading "NOT AN EXIT" shall be installed at all doorways, passageways or stairways which are not exits, exit accesses or exit discharges, and which may be mistaken for an exit. A sign indicating the use of the doorway, passageway or stairway, such as "TO BASEMENT", "STORE ROOM", "LINEN CLOSET", is permitted in lieu of the "NOT AN EXIT" sign.